

MOTOR AGE

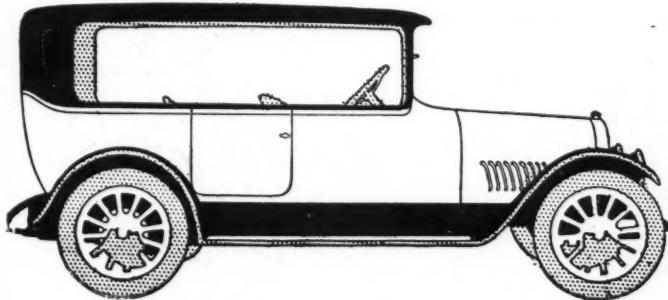
Vol. XXXI
No. 24

CHICAGO, JUNE 14, 1917

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Springfield

Type Bodies

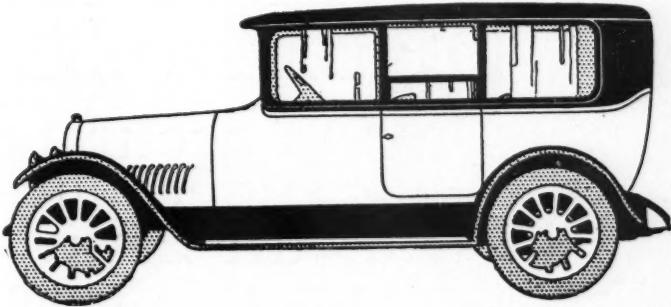


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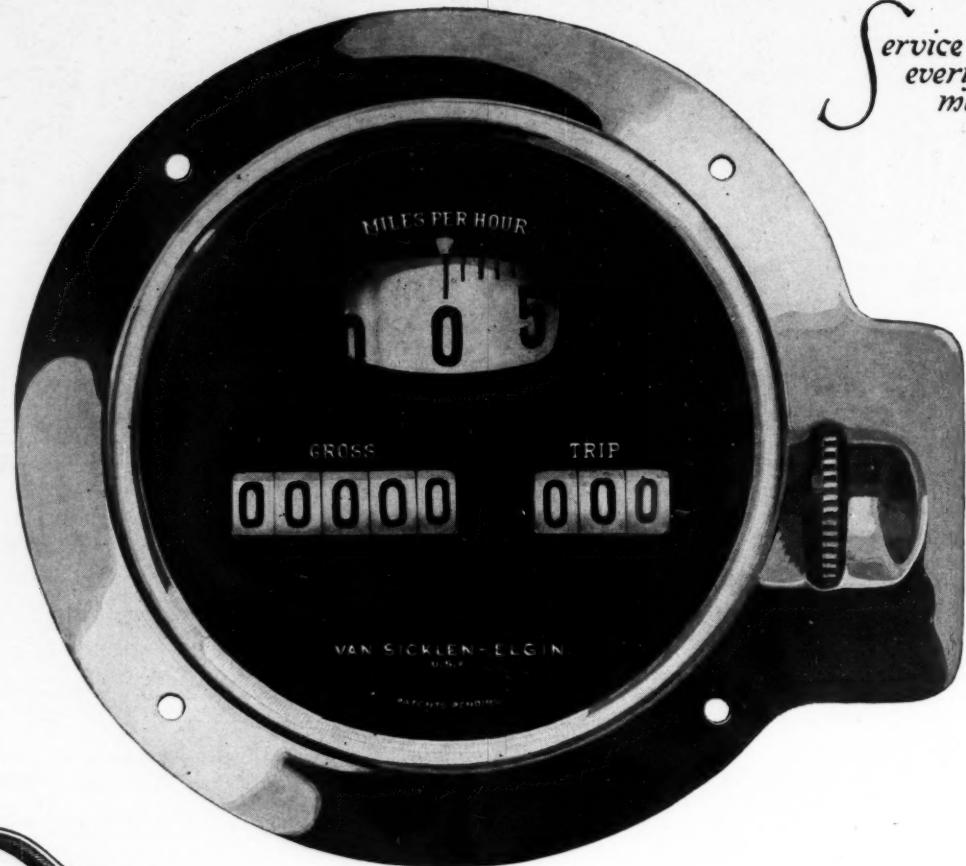
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MOTOR AGE

Published Every Thursday by the
CLASS JOURNAL COMPANY
 Mallers Building
CHICAGO ILLINOIS

Entered as Second-Class Matter September 19, 1899, at
 the Postoffice at Chicago, Illinois, Under Act of March 3,
 1897—Member of the Audit Bureau of Circulations—Copy-
 right, 1917, by the Class Journal Co.
 United States, Mexico and U. S. Possessions One Year \$3.00
 Canada One Year \$5.00
 All Other Countries in Postal Union One Year \$6.00
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 acknowledgment of subscription.

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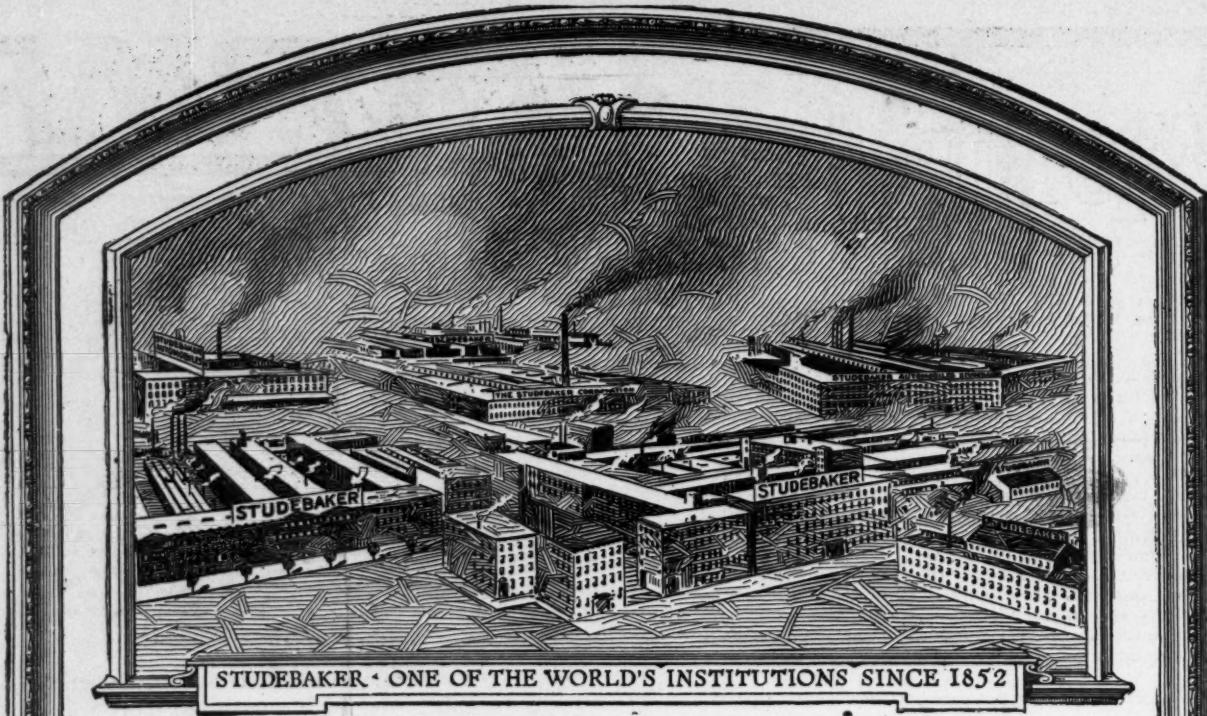
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MOTOR AGE



Oxen are found very useful for moving trucks about the depot

The C'A'M'A' Backbone of the French Army

by W. F. Bradley

GROUPS of initials are employed almost exclusively to designate the various departments of a modern army. To the average civilian they are as unintelligible as Sanscrit, and even to the military man whose training did not extend beyond the middle of 1914 these letters are an absolute mystery. Thus, under the title of the *cama*—they pronounce the c hard, as in “kill”—there does not appear to be anything to interest a motor car enthusiast.

However, beneath these apparently unintelligible letters, the French translation of which it is hardly necessary to give, is to be found the great motor organization which stands back of the French army in the field. That organization is the biggest the world has ever seen, or probably ever will see, for the French army makes a greater and more varied use of motor vehicles than any of her Allies, or enemies,

in the field. The *cama* is the huge motor supply department of the French army. If, as seems almost certain at this writing, the United States become sufficiently involved in the war to be interested in the *cama* it will establish that department at Detroit, but France possesses two motor producing centers, the greater one being in Paris and the lesser in Lyons. Thus she has a *cama* in each district. The latter one, with which this article is particularly concerned, received motor cars from the Lyons factories, from Italy, and from the few makers in the center, east and west of France. It differs from Paris in that it handles neither metropolitan nor American makes.

Between the factory which produces cars and the army which uses them, there is this important and extremely useful organization. Trucks and touring cars are not placed on freight cars and shipped direct from the factory door to the war zone—at any rate not under the highly-developed

war system prevailing in France. The *cama* places contracts with the various factories; it receives fleets of complete cars or bare chassis as the case may be; it tests every one of them; it equips them much more carefully than the private motorist fits out his car for a long tour; it trains drivers for these vehicles; it forms them into convoys in charge of competent officers, and finally it sends them out, complete in every respect, for active service in the war zone.

Fiat, for instance, is one of the most important suppliers to the *cama*, but as these factories at Turin are supplying the Italian, English, Belgian, Russian, and probably also the armies at Salonica, with various types of vehicles, it is more advantageous that they should send the standard chassis, without attempting to equip it to suit the requirements of the individual armies. The Lyons factories, which are located almost at the door of the *cama*,



French army motor corps officers and at the left, W. F. Bradley, Motor Age's special correspondent



Upper left—A derelict of the war.
Upper right—Some more of the wreckage of war of which there is much to be found in northern France. In oval—How spare parts are packed and sent with convoys to the front

tors engaged in supplying the army. Not very many of these vehicles sent out of the war zone are ever sent back again. On the other hand, convoys which have suffered heavy losses in the field are sent to the rear to be re-equipped and sent out again with the same men and the same vehicles.

When chassis are received from the manufacturer they are supposed to be mechanically perfect, but nothing is taken for granted. Each shipment is taken on the road for a test run of about 30 mi., an experienced army officer being in charge and a factory driver at the steering wheel. This trip is not intended to test the endurance of the chassis, but just to assure that nothing has been neglected, and is a guarantee that when the convoy goes on the road the army driver will not have to tinker. Lubrication is verified, for some makers are not above practicing such small economies as putting the smallest amount of grease or oil in the transmission, the rear axle, the engine, steering gear, etc. Close reckoning is sometimes carried so far that the amount of gasoline put in the tank is only just sufficient to go from the factory to the gates of the army depot. Sometimes the quantity was short by 50 yd., in which case the army had to supply a spare can until the officers refused to consider any vehicle delivered until it was actually inside the grounds.

No Body or Chassis Changes

Obviously no changes have to be made on the chassis, nor does the body need any modifying, but important work has to be done by the *cama* in the equipment of the cars and trucks. No motor car manufacturer makes his own accessories, so that there is no advantage in allowing the truck maker to buy his lamps from Jones, pay one of his own men to fit them, and then sell them to the army. The motor section of the army goes direct to Jones and buys its own lamps, and not

do not always produce their own bodies. Thus, instead of allowing these factories to send their chassis to a local bodymaker, the *cama* takes delivery of them in the first place, passes contracts with the bodymakers, and incidentally supplies most of the raw material, and attends to the detail equipment in its own shops.

To American eyes this may seem a needless complication and a source of additional expense, but in other and similar organizations, where supposedly complete American vehicles are handled, the same preparations have to be gone through. Not one of the American cars or trucks is equipped exactly as the army wants it, and even if they were correctly equipped, the *cama* would be necessary in order to verify them, to supply them with drivers, and to send them away as self-contained units capable of following an army anywhere.

Army Equips Own Vehicles

It has been proved, however, that the army can get better service and cheaper service by equipping its own vehicles than by getting them complete in every respect from the factory. I was given examples of this in lamp brackets, in spare gasoline can carriers, in tool racks, and in various other fitments, all of which could be made by the army cheaper than manufacturers could supply them. In arriving at prices, standard rates of wages were calculated, and not an estimation of the cost of the soldier to the state.

On the day I first visited the *cama* there was a display which could not have been better staged if it had been done on purpose to impress. In the main avenue were lined up forty Fiat field ambulances, completely equipped and ready to leave for the front. In another avenue were twenty Berliet trucks and one repair truck, also ready to go out in active service. When I returned twenty-four hours later the ambulances had disappeared and their place was occupied by a long line of Fiat 15-20-hp. chassis which had been verified and were about to pass into the body builder's hands; in place of the finished Berliet trucks there was a row of Peugeot chassis ready to undergo treatment.

This transformation goes on day after day with unfailing regularity, one or several convoys going out every twenty-four hours and bare chassis coming in with almost the same uniformity. In the grounds of what once had been a French Coney Island motor car chassis to the value of about \$1,000,000 were to be found under tarpaulins ready to go into the body-making and fitting shops.

Another department of this organization deals with repairs only. France has organized one immense central clearing station for all motor vehicles which cannot be repaired by the traveling workshops attached to the convoys in the field. From this clearing house the wrecks are sent to the repair departments of the different *camas* where they are completely overhauled and most of them sold to contrac-

only lamps but jacks, tools, sponges, oil cans, horns, and the thousand and one accessories required on cars and trucks. This system has been extended so that the army now makes many of its spare parts. In any case the army would have to supply the factory with raw material, for under present conditions the Government practically has a monopoly of all metals; thus it is cheaper to keep the material and make the parts in the army shops. In other cases stampings and castings are received in the rough and machined at this central supply depot. Again the cost is lower, even when estimating wages at the rates paid in the open market.

Maimed Men Given Chance

All the men employed in the workshops are the older classes who could not in any case be called up for service at the front. As far as possible maimed men are given a chance, for France has seriously tackled the problem of giving a new start to men who have suffered some physical disability while fighting for the country. Although this is a purely military establishment and every worker from the most skilled engineer to the roughest laborer has a military rank, female labor is not refused. The example can be found even on a bigger scale in the civilian establishments.

The system of tools and spares developed by the *cama* is remarkably interesting. The guiding principle is that the convoy, which may consist of twenty to thirty trucks, shall have everything necessary to keep it working under the best conditions, but that the individual drivers shall not be given a single tool more than is necessary. Wood models have been made of the tools which accompany each make of truck. These comprise a set of wrenches, screwdrivers, a couple of files, grease gun, oil can, big shifting spanner, valve remover, etc. They vary a little according to the makes, but in no case is an unnecessary tool supplied. In the carpentry shops tool carrying boards are made for each type of truck. These are hard-wood boards with the place of the tool scooped out, and leather to hold the tools in position, according to the plan generally adopted in workshops. These tool racks have to be hung in one of the lockers under the body overhang, and each man is responsible for his own tools. On inspection day the officer in charge can tell at a glance whether any tool is missing or not.

With the exception of a few spark plug washers, no spare parts are in charge of the drivers. It is found that this is the only satisfactory and economical way to handle vast fleets of army vehicles. To make each vehicle self contained the driver would have to be given a wasteful wealth of parts; if a selection is decided on, the probabilities are that on not more than 1 per cent of the occasions would the driver have the part required.

All spares are put in charge of the mechanics aboard the repair truck attached to the convoy. This stock includes

everything liable to wear or breakage in active service. There are three sets of all ball bearings used in the truck: front axle assembly, steering gear, two magnetos, magneto parts, carburetor and carburetor parts, a complete transmission, a radiator, crankshaft, camshaft, pistons, connecting rods, valves, valve springs, radiator hose, water pump, gaskets, bolts, nuts, washers, spark plugs, and various small parts. All these spares are packed in specially made boxes in such a way that they cannot deteriorate no matter how long they are kept out of use, and so that the mechanic can control his stock merely by glancing in the box. Spark plugs, for instance, are screwed into a shelf; valves are set up in a suitable sized hole, complete with spring and cotter. Inside the lid of each box there is a printed list of the contents, while in addition the driver keeps a list of his stock and a record of all parts given out. On the sides of each box are four inverted U-forged irons to receive a couple of bars by means of which the biggest box can be conveniently handled by a couple of men. When operating from a fixed base the spare parts boxes can be stored with the knowledge that their contents cannot be tampered with, and when on the road they will all fit inside the repair truck.

Every truck going in active service carries two 50-litre drums of gasoline as a

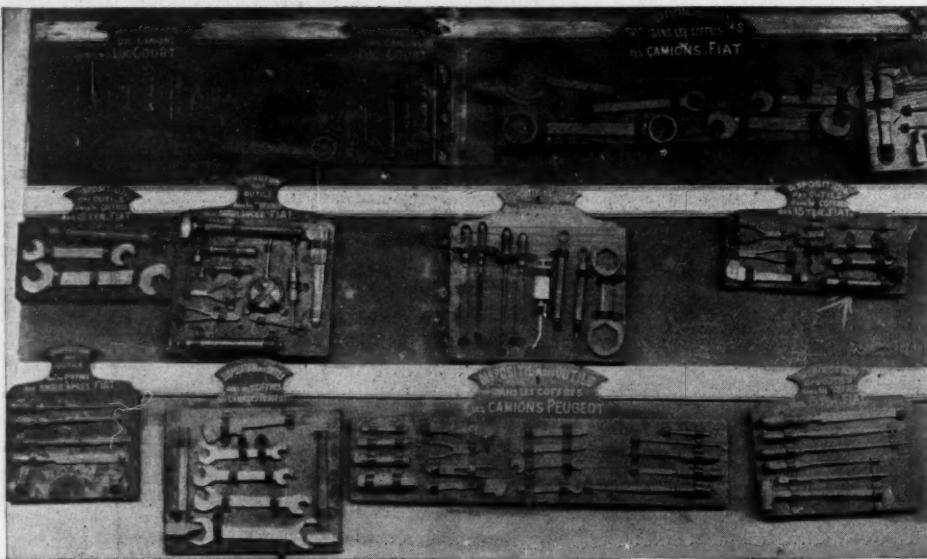
reserve supply—this being equivalent to about 26 gal. The drums are a stout galvanized iron type used by the gasoline refiners and having a couple of screwed brass stoppers. They are laid on their sides in a special cradle under the overhanging portion of the truck body. They cannot roll or chafe, are not liable to leak, and are instantly available when required. It is understood that this supply shall be kept for emergencies, as for instance when an advance is made and the ordinary supply of gasoline cannot be brought up to keep pace with the convoy.

Competent Men Necessary

As important as the preparation of the trucks is the instruction of the men to handle them. If America puts an army into the field, it is practically certain that she will accept for her motor service only those men who have had previous driving experience. France has had to mobilize every able-bodied man within her territory, and those responsible for her military policy have always considered that a man's physical qualifications as a fighting unit were more important than his experience as a motorist. The important question is, "Can the man fight?" and if the answer is in the affirmative the man goes into the firing line, whatever his qualifications as a motorist may be. Those who cannot fight, because of age or phys-



Above—Ambulance chassis waiting to receive their bodies. Center—A few of the trucks as they are received from the makers. Below—Convoy of motor ambulances ready to leave for the front



Above—Beginners learning to drive over a winding course. Below—Model tool layout for various types of trucks. These are the only tools given to drivers

ical disability, are turned over to the motor section to be shaped into drivers.

15 Days Completes Course

Men who have never before driven a car, who probably never have ridden in one, are passed into the schools and must come out fifteen days later capable of driving in convoy formation at the front. Obviously the system is not ideal, as many critics are endeavoring to point out, but the military authorities consider it the best under the circumstances. The school instructors, who are certainly the best qualified to judge the system, are not found among the grumblers. One of them, who admitted that he had instructed 12,000 drivers, said: "With the material they give us it would be hopeless were it not for the determination of the men to become efficient. We have a certain number of young men who are turned over to us because of wounds received at the front; they are good material, and it is quite easy to train them in fifteen days and with only thirty hours' actual driving, but most of them have passed or are approaching 40, and are agricultural laborers, or farmers, with no knowledge of cars. All the metal workers and wood workers, who would have natural aptitudes for driving, have been taken out. When I first realized the kind of pupils I had to deal with I was in despair, but each one of these men is

as anxious to become proficient as we are to get him through his course on time. Some of these men can only barely read and write, yet they all buy motor text books and study them nights. If you had to creep into their quarters you would find that there was only one subject of conversation—motor cars and motor driving."

Not one but a dozen instructors, questioned individually, expressed the same opinion: "few natural qualifications, but an enormous determination to succeed." One instructor said: "About 25 per cent

of these men fail to get better than a second-class driving certificate during the time allowed in the school, yet of these all but 5 per cent pass first-class after a fortnight on the road. Our worst pupils, you will perhaps be surprised to hear, are not illiterate farm laborers, but lawyers who have reached middle age without doing any manual labor."

The Training Ground

A big open space, without obstacles and with a few hills has been turned over to the instructors as a training ground. As the men have to be turned out efficient in fifteen days, work goes on from 7 in the morning until 5 at night, with a break at midday, and is never stopped because of weather conditions. A few days before there had been heavy snow and frost, but it made no difference to the school; conditions were harder for the learners and valuable for the advanced pupils. The value of an open space for training is that accidents are rare. When the men can steer straight, they are made to drive the cars between blocks of wood placed on the ground; practice in hill-climbing and gear-changing is obtained on a hilly portion of the ground which gives all the advantages of the road without any of its dangers. The first two days are spent on touring cars in order to learn the use of the different pedals and levers and to steer a straight course. Truck driving follows, the last few days being spent on roads of a rather difficult nature and with the make of truck the pupil will have to drive when he leaves the depot. Only the necessary theoretical instruction is given to make the men competent drivers, it being recognized that men can perform very valuable service at the front without having any conception of magneto construction, gear ratios, or volumetric efficiency.

Comparatively few of the officers in charge of this central supply depot were professionally connected with the motor industry before the war. Many of them were engineers in other branches and they are all of them enthusiastic, competent and independent in their views on car design and construction. Most of them have had long



This indicates how beginners are given lessons in reversing



This shows a part of the truck section of the French army motor school. Here the men are given the instruction that makes them capable when called to act in an emergency

experience with convoys at the front and have the defects and qualities of every make—French, English, American, and Italian—at their finger tips. Unlike men professionally connected with the industry, they are free from prejudices and do not hesitate to point out the defects of supposedly perfect makes and to give praise where it is due to comparatively unknown manufacturers.

Breakage of Stub Axles

They are unanimous in stating that the most common defect, and the one from which every make suffered, particularly in the early stages of the war, is the breakage of stub axles due to crystallization of the metal. Hard driving, roughly paved roads and the constant dropping into shell holes were responsible for this. The trouble has been largely overcome by more correct designing of the parts. Abrupt changes in the section of frame members always brought about breakages. In the repair shop one truck, by a high-class maker, was pointed out with the rear springs carried in a recess of the frame, although there was a liberal supply of metal and the horizontal section was broad, the frames always broke at the bend when subjected to the strain of active war service. On another truck the frame cracked at the point where the front shackle of the rear spring was riveted to it. One leading American and one well-known French make were reported to give trouble owing to the breakage of crankcase arms. This was overcome by interposing stout coil springs between the arm and the main or sub-frame, thus giving a flexible instead of a rigid mounting.

The French transport officers express themselves very satisfied with final drive by means of side chains. Exposed chains average 10,000 miles on war service; inclosed chains as used by Fiat and most of the Italian makers, have at least double this life. While the value of cases as a means of lengthening the life of chains was not denied, it was considered that the exposed chain was practically ideal, provided drivers gave a reasonable amount of attention.

Final drive by worm does not meet with much enthusiasm, for the few French trucks fitted with it have given trouble by reason of defective lubrication. An

important exception is the Latil tractor, but on this make there is a pump in the housing and oil is carried under pressure to the worm and the worm wheel. Pierce-Arrow trucks were also pointed out as being absolutely free from axle trouble. The bevel type arched rear axle, which allows the same tilt to be given to the rear as to the front wheels, has not proved very satisfactory, there having been trouble with the long drive shaft in the housing.

The 5-ton truck is condemned for war service. It is cumbersome on ordinary roads and is destructive of road surfaces. The 3½-ton type generally employed is sufficiently big for all purposes; some of the officers are of the opinion that a 2½-ton model would be even better.

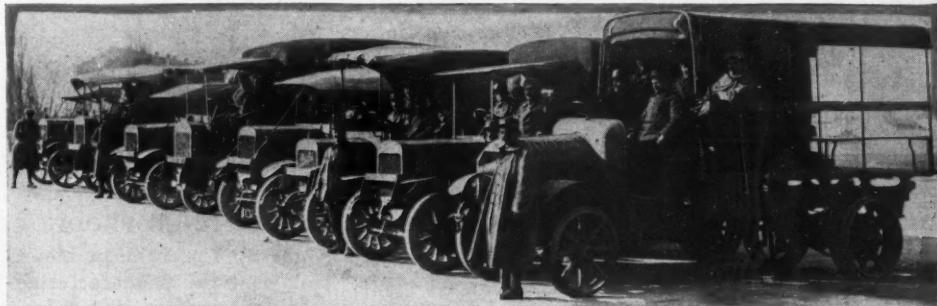
American trucks receive a considerable amount of criticism. Pierce-Arrow and Packard receive nothing but praise, but there are other makes for which nobody has a good word. Design is frequently poor and gasoline and oil consumption always extravagant. With one exception Whites are satisfactory; this make has a two-bearing crankshaft with internal oil passages.

Centrifugal force opposes the passage of the oil to the center of the shaft, and the connecting rod bearing of No. 3 cylinder melts with alarming regularity.

Full pressure oil system was considered far superior to circulating type, for the least obstruction was liable to cause this latter to break down, and if the truck had to work at an unusual inclination the rear cylinders were flooded and the forward bearings ruined.

Pressure-Feed Gas Condemned

Pressure feed gasoline supply is condemned, particularly if the pressure is taken from the exhaust. There is always water from condensation in the pipe, and in winter this water freezes and gives endless trouble. Unit construction of engine and gearbox is strongly condemned, not because of any deficiencies in the field, but because of excessive labor involved when any repairs have to be carried out. No satisfactory non-skid for solid tires has yet been produced. Cross chains are good in very heavy mud and snow, but on a greasy road they destroy both the road surface and the tire.



Above—Students in the truck division of the school being given training. Below—Fitting up light trucks at the French central motor supply depot

Urge War Prosperity

Charles M. Schwab Tells World
Congress Good Times Must
Finance Expenditures

Machines and Agriculture to Decide
Outcome; Not Men

DETROIT, June 11—Special telegram—D—"The war cannot be financed unless we have prosperous times," said Charles M. Schwab, president of the Bethlehem Steel Co., in the opening address today of the second World's Salesmanship Congress. He made a plea for the aristocracy of industry and deprecated the agitation toward economy which would jeopardize industry. Times must be kept good; in fact, with the big war expenditures to be made here, they cannot help but be good, he said.

"And," he added, "it is not the rich men who must finance the war. It is the workingman and the middle class man. This morning I have a telegram from the Bethlehem steel plant that more than \$5,000,000 has been subscribed to the Liberty loan by the men in our plant. The officials were barred from this subscription; it was all done by the men, and 80 per cent of those who were suggested as possible subscribers have bought. By next week I will not be surprised if it were 95 or even 100 per cent.

"If there is one thought I wish I could give to you all; to be spread over the whole land, it is the seriousness of this situation. It is not the situation we read about in the newspapers and which does not materialize. It is going to require the active part of everyone in the United States.

Machines and Agriculture

"The war will not be decided by any one great military man. Look back through the history of the war and see how many have appeared thus far. Earl Kitchener told me it would be not a war of men but of machines and agriculture and that the nation that could produce the most machinery and feed its soldiers the best would be the nation that would win the war.

"I have at home an autographed letter from Earl Kitchener in which he said that the organization that produced for Europe 1,000,000 rounds of ammunition a month contributed more to the Allied cause than any other single factor, and this organization we have placed at the disposal of the United States, reckoning not what our profits may be.

"The great leaders of industry, agriculture and home politics are more important figures than the military men, so if, on account of age, you have been denied the privilege of going to the front you may stay at home and help win the

war with the assurance that the glory in the future will be for all."

In other sections of the congress's sessions it was suggested that the idea of economy is being misunderstood and should be supplanted by the idea of elimination of waste.

The congress opened this morning in the Arcadia auditorium. Departmental sessions were held during the afternoon with a general session this evening at the auditorium, where the remaining meetings of the congress will be held. The last session Thursday evening will be devoted to elections and congress business.

Secretary-Manager D. M. Barrett reported that the congress, which was started a year ago, now embraces 16,000 members in forty-five clubs. By next year he hopes the membership will be 100,000 in more than 100 clubs. St. Louis won the club cup. It has 3,529 members and sent 151 delegates. It wants the 1918 meeting, as does Minneapolis.

At the motor sessions this afternoon an important thought was that dealers must intensify in selling and must plan business readjustments to meet the new conditions, but that there is every reason why business should continue to be good.

C. H. Foster, Cadillac distributor in Chicago, defined service to car owners on Monday and drove home the thought that to make the service department profitable and to eliminate the idea of the customer of trying to get something for nothing it is necessary to treat the service department as a repair and adjusting department. The word "service," according to Mr. Foster, is a misnomer.

PARMELEE TAXI DRIVERS OUT

Chicago, June 12—Eighty taxicab drivers employed by Frank Parmelee Transfer Co., walked out yesterday afternoon while negotiations were in progress between the company and union officials. The men are seeking an increase in wages from \$70 to \$80 a month and shorter hours. Union officials intimated that the walkout was unauthorized and was instigated by I. W. W.

PULLMAN TO CONTINUE PRODUCT

York, Pa., June 9—The Pullman Motor Car Corp. will continue manufacturing Pullman cars under a contract between the receivers, W. A. Keyworth, C. L. Hoff and Henry Schmidt, and the National Products Co., Newark, N. J. A petition for authority to sell the plant and assets of the Pullman company to the National Products concern has been presented by the receivers, to Judge Whitmer of the U. S. district court, Sunbury, Pa. Purchase of the Pullman company will be approved by the court on June 15, providing no objections are entered by creditors in the meantime. It is stated that the entire organization of the receivers of the Pullman company will be maintained by the National Products Co.

Modify Truck Standard

Quartermaster's Department To
Accept Vehicles Most Nearly
Like Specifications

No Other Classes to Be Specified
for Some Time Yet

WASHINGTON, D. C., June 11—The Quartermaster's Department of the Army, which in May issued specifications for Class A and Class B trucks, not only has decided not to issue specifications for classes of trucks for which bids were opened Sunday as told elsewhere in this issue, other than A and B, but the executives of that department, while not deciding entirely to suspend the first specifications, have modified them to the extent that trucks will be purchased which meet as nearly as possible the requirements of the specifications for A and B classes.

The Quartermaster's Department now realizes it will be impossible to get trucks for army purposes within a year unless concessions are made, although Major Drake of the purchasing bureau of the Department states he has been informed some of the manufacturers will be able to turn out trucks within the year.

Major Drake said the Department is not expecting all of the manufacturers to do this, and it is willing to co-operate with them to the end that the best possible results be secured.

The plan now is to call upon the manufacturers to do the very best possible in the way of expediting delivery to the government, and wherever possible to do so to make such changes from their own specifications, in harmony with the government specifications, as is found possible.

The purchasing officers, therefore, have been given authority to use their best judgment at present in placing orders, while the Department will bend its energies toward having built as soon as possible a military truck which will include in specifications drawn for it the changes which experience in the field with trucks suggests to the government should be made.

Major Drake stated to the representative of MOTOR AGE that he had not received a memorial from a special committee of the N. A. C. C. named recently, with Windsor T. White as chairman, setting forth the fact that it would be impossible to furnish such trucks as called for within a year. However, in view of the action voluntarily taken by the Department, the result sought in the appointment of this special committee seems to have been already brought about.

MECHANICS RUSH TO ENLIST

Washington, D. C., June 11—The motor car factories and the service stations of the country are being drawn upon for

hundreds of mechanicians, experienced and comparatively inexperienced, for service in the army both at home and abroad. That thousands of these mechanics will be needed was stated at the War Department. Those who offer their services will enter as enlisted men at \$30 per month. This is in addition to their keep, in other words, their clothing, food, shoes, medical attention and quarters.

They may, if capable, expect reasonably rapid promotion, it being possible for them to go up to the rank of sergeant, which pays \$72 per month. This, also, is velvet, hence, with opportunities for seeing service abroad, the army is proving a drawing card to the motor workers, and a disquieting outlook is in prospect for employers, especially in view of the coming demands for motor cars, trucks, tractors, etc., by the government.

It is possible that, should the situation grow too serious, some plan will be worked out between the government and the employers, that this drain of the forces of workmen may be checked.

Young men, not only from motor car establishments but from colleges and technical schools are enlisting for service in the field ambulance service abroad. In such cases they receive practically no pay. In other words, but a few cents a day, the same as paid privates in the French army. Also, they agree to pay certain of their personal expenses while in the service, putting up bonds for about \$400 each before being accepted, to guarantee these.

The French privates, while getting only a nominal compensation, however, have their families provided for by the government on a sort of pension effective during the service of the head of the family.

PASSENGER CAR USE IN ARMY

Washington, D. C., June 11—Inquiry at the War Department as to the possible use for passenger cars being bought by the government in large numbers, elicited the information that these machines will be needed for the use of officers of the Quartermasters Corps, for messenger service, and in various other ways, especially at the cantonments to be built for the training of the conscripted army. These cantonments will take care of 30,000 men each, and this means a great number of officers for instruction purposes.

STAVER NAMED DREXEL RECEIVER

Chicago, June 12—Harry B. Staver, president of the Staver Carriage Co., was appointed receiver for the Drexel Motor Car Corp. yesterday by Federal Judge Carpenter. Mr. Staver will serve without compensation and his bond has been fixed for \$50,000. The court was advised that a \$12,000 reorganization fund has been raised. Thomas J. McFarland and Mark P. Bransfield, heavy investors in the company, have indicated their willingness to turn over \$500,000 worth of real estate to square up their debts to the company.

Car War Tax 1 Per Cent

Senate Committee Drafts New Section in Revenue Bill; Concurrence Expected

Excess Profits Clause Abrogated—Postage Rates Undetermined

WASHINGTON, D. C., June 11—The Senate committee on finance has finally drafted the section of the war revenue bill under which motor vehicles will be taxed, and it has fixed this tax at 1 per cent, roughly, on the selling price of passenger cars. No tax whatever is provided for on motor cars or trucks used exclusively for business. A total of \$40,000,000 is expected to be raised. Under the schedule agreed upon taxes would be assessed as follows:

Machines originally listed at \$500 or less, \$5; from \$500 to \$750, \$7.50; from \$750 to \$1,000, \$10; and for those of greater value than \$1,000, \$5 for each \$500 above that amount.

A discount of 10 per cent per year from the original list price of each machine would be permitted. Members of the committee express the view that this section will be agreed to on the floor of the Senate, and that the House will also approve it.

The provision in the House Bill for an excess profits tax on manufacturing establishments of 16 per cent has been stricken from the measure. The Senate committee will adopt in lieu of this section a taxing plan similar to the English system.

The committee has yet to reach a decision on the proposed tax on newspaper and magazine advertising or the alternative, an increase in second class postage rates.

National Touring Club

Motorists Form New National Organization

CHICAGO, Ill., June 12—A new motor organization of national scope to be known as the Touring Club of America had its inception at a meeting of motorists at the Chicago Automobile Club last night. Its object is to further good roads, just and equitable motoring laws and to promote the interests of motoring in general. Last night's meeting, while officially only the organization of the Chicago division, it is anticipated was the beginning of a national organization in which there will be divisions in the more progressive towns and cities throughout the United States.

A set of by-laws was drawn up and officers for the Chicago division elected. William G. Edens is president; William F. Grower, first vice-president; Arnold J. Joerns, second vice-president; Joseph E. Callender, secretary, and Lucius Teter, treasurer. Edens is probably the

most prominent man in good roads work in Illinois, being president of the Associated Good Roads Organization of Cook County and Illinois, president of the National Parks Highway Association, and active in other ways. Joseph E. Callender is secretary and chairman of the Contest Board of the Chicago Automobile Club, and William F. Grower has been in charge of city park and boulevard improvements, in Chicago.

According to the plans of the 100 founders of the new organization who met last night, there is no initiation fee, and dues are \$10 per year. This includes free legal advice, touring information, the Automobile Blue Book, radiator emblem, subscription to the club magazine, etc.

A meeting to complete the organization is scheduled for next Monday evening, and plans for completing the organization of the national body will be worked out then. The headquarters of the Touring Club of America are in premises leased from the Chicago Automobile Club. This whole plan is to be a business organization, without social features.

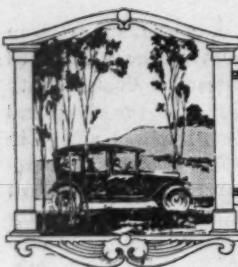
REMY'S TO BUILD TRACTOR

Indianapolis, Ind., June 11—The Remy Bros. Tractor Co., which will build a plant at Kokomo, Ind., has been incorporated with a capitalization of \$500,000, all stock being fully subscribed. Frank and Perry Remy, Indianapolis, formerly of Anderson, Ind., where they established the Remy Magneto Co., are the president and secretary-treasurer, respectively, of the new company. Elwood Haynes, president of the Haynes Automobile Company, and A. G. Seiberling, general manager of the Haynes company, are stockholders.

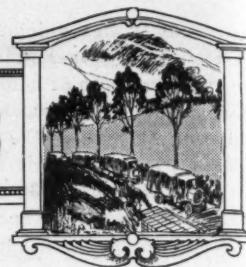
The company now is negotiating for the purchase of a factory site and it is expected that the work of erecting a plant will be started soon. The company intends to place about twenty-five tractors on the market this year, but after the first year production is to be undertaken on a large scale.

CARS LIGHT TRAINING CAMP

Washington, D. C., June 11—The utility of the motor car was demonstrated when the Friars, desiring to do their bit toward making livable the life of men in the army training camps, visited Fort Myer, near Washington, for the purpose of providing an al fresco entertainment for the soldiers. Arriving at Fort Myer, those members of the Friars who made the trip were met with a driving rain which caused a change in plans as the electric light plant at the camp had been put out of commission by an electrical storm. Nothing daunted, two or three motor cars were put into service, their headlights turned on the impromptu stage, and the performance went merrily on.



EDITORIAL PERSPECTIVES



U. S. Needs Truck Drivers

UNCLE Sam is about to buy 70,000 motor trucks, which means that he will have use for that many drivers. Signing up drivers at the rate of 200 a day would require a full year to get this quota. The Chicago branch of the Quartermaster's department has been almost six weeks signing up 200. Whether or not any of those who are drafted into the service among the first half-million will be taken into the Quartermaster's department is not known, but at the rate enlistments are being made it is doubtful if a sufficient number of men could be obtained under the volunteer system to man the vehicles which the Government is about to purchase.

IF THE draft is applied to the Quartermaster's department it is almost certain that men who have mechanical knowledge will be selected as drivers. France found it necessary to train men as drivers in order that its motor organization, which has been characterized as the backbone of the French forces, might move smoothly. Uncle Sam has not trained many men so far to operate motor vehicles but he may have to in order to get competent men as rapidly as he needs them. Those who have

offered their services in the Quartermaster's Enlisted Reserve Corps have found acceptance the exception rather than the rule. This department has called for practically physically perfect men, of a given minimum and maximum height and weight. This has ruled a large number out whose knowledge of motor mechanics might have made them of service.

* * *

WAR-TIME economy precludes the taking of mechanics from the factories; the men must be obtained from the ranks. The prospective truck driver for Uncle Sam must be proficient in car and truck construction and be able to make his own repairs. The fact that he may be called upon to solve his own problems in emergency is taken into consideration and the applicant has no opportunity to brush up on test questions, for the examination is oral and the examiner may ask any one of several hundred questions that comes to his mind. He does not expect a text-book answer but he expects the answer to be practically correct. A school for truck drivers operated by the Government seems the only solution if the motor fleet of Uncle Sam is not to go begging for drivers.

Army Motor Vehicles

OFFICERS of the Quartermaster's department of the United States army took a wise step—in fact, a necessary one—when they made it known to the motor industry at large that motor truck manufacturers who were asked to bid on the type A and type B army specifications for military chassis would not be required to confine their bids to only such vehicles as conformed to the government's specifications. Soon after the government's specifications for what are popularly termed the 1½-ton and 3-ton military trucks were made public, it became evident that it was a physical impossibility for the manufacturers of commercial vehicles to produce trucks coming up to these specifications in any quantity in less than three or six months' time.

* * *

IF TRUCKS are to be had in quantities in a shorter time than that, the government perforce must accept vehicles which in many respects do not conform to the standard specifications. This was made plain when the bids for the type A and type B vehicles were opened last Sunday. Very few vehicles were promised by the manufacturers to conform with standard specifications in less than three months' time, some bidders even requiring a year to commence delivery. Most of the truck manufacturers who offered to supply trucks made their bids

on vehicles which did not depart greatly from their present commercial production. Many of them, however, supplemented these bids with quotations on the government specification trucks, but instead of specifying immediate to 30-day deliveries, did not promise to begin delivery on the army standard chassis before the first of next year.

* * *

THE promulgation of standard specifications for army vehicles was a very wise and timely act, for there is nothing that is needed more in military work where large numbers of certain types of products are used, and in which replacements under war conditions will be necessary, than standardization. It was necessary that truck builders in time should be furnishing standard units for military work. On the other hand, the army must be supplied immediately, and while manufacturers are getting tools and materials and parts for the standard chassis, the government can do no better than utilize semi-commercial productions until the standard ones can be had in sufficient quantities. Meanwhile, it is to be assumed that in all probability the standard specifications will be modified in many details both from cost and production standpoints, without seriously decreasing their military effectiveness.

A New National Club

WHETHER or not the new motoring organization which had its birth this week as the Touring Club of America becomes a national force among motorists will depend very much upon how the ends for which it is organized are approached. Certainly, the aims of the new body are worthy of the support of every motorist. It is equally certain that if the national organization is officered by men of the caliber of the officers of the founder chapter, Chicago, it should prove a vital force in furthering the interests of motorists in America, and there is no reason why it should not.

IT MIGHT be thought at first blush that the field of the new organization overlaps to a large extent that of the older and strong American Automobile Association. Proponents of the new club, however, do not feel that their efforts will conflict or overlap those of the A.A.A. inasmuch as such things as contests, and other features which have been the strongest hold of the A.A.A. on American motordom, do not enter into their plans. In fact, it is understood that membership in the new association is to be fostered only through clubs that are part of the American Automobile Association.

America and the Red Cross

“UNTIL the Russo-Japanese war more soldiers died on battlefields from preventable diseases than from acts of the enemy.”

“THE death rate among medical men, nurses and ambulance drivers is greater than in any other branch of the service, not excepting aeronautics.”

DR. FRANKLIN H. MARTIN, in charge of Red Cross work, medicine and sanitation, Council of National Defense, at the Editorial Conference of the Associated Business Papers in Washington recently, gave expression to the two quotations above. In his interpretation of the Red Cross and what it means to the soldier on the field, he said:

SANITATION and scientific medicine came into its kingdom at the time of the Russo-Japanese conflict. If we fail in one iota to keep up that same standard that was developed in the Japanese-Russian war, and that is now being maintained and has been maintained in the German war from the beginning of the conflict, and that is now being maintained on the western and other fronts, you will know where to place the responsibility.

“WE found that the regular army,” he continued, after telling of the efforts to organize the medical profession, “as it then existed, the militia, contained a very small proportion of the physicians and sanitarians that would be necessary to run an army of 1,000,000. We, therefore, divided the United States into committees. These committees were asked to select the doctors in their state at the rate of one in ten who would best be fitted to serve in case of conflict. These lists were divided into specialists and from these have been selected men who will care for sanitation and medicine in this conflict. We are now planning for the 2,000,000 men who have been called, including those already in service, planning for ten to a thousand.

“THE need is probably greater for medical men than for any other branch of the service. The reason for that is this: England and France, in this great war, have practically depleted their civilian population of medical men. These medical men have gone to the front, have gone into the hospitals, and the waste among the medical men and nurses and ambulance drivers has been far greater than any other branch of the service, not excepting the air service. The reason for that is this, the medical man, the ambulance man, the stretcher bearer must go to the field, he must work, he must continue to work, no matter what the condition of the battle may be, and without very much regard as to where his position in the battlefield may be. In other words, in one recent retreat, 267 doctors were exploded to atoms in one half hour—more than half the number of doctors in our medical service in the whole United States Army and the National Guard at the beginning of this war. These men were in the rear, were coming up, and the land was mined, and they just accidentally came upon this spot and were destroyed almost instantly. As the result of that, 5000 men were lying on the ground for 72 hrs. before they could bring medical men from other parts of divisions.”

THE men in the trenches in Europe need American medical men. There is a dearth of physicians and surgeons in Europe. We, as Americans, owe our generous support to the Red Cross. Those who go to the front as doctors, nurses and ambulance drivers face as great danger as the soldiers in the trenches. We, at home, should give our support so that the work of those on the fields ministering to the wounded can be performed efficiently.

Tuning Up for Chicago Derby



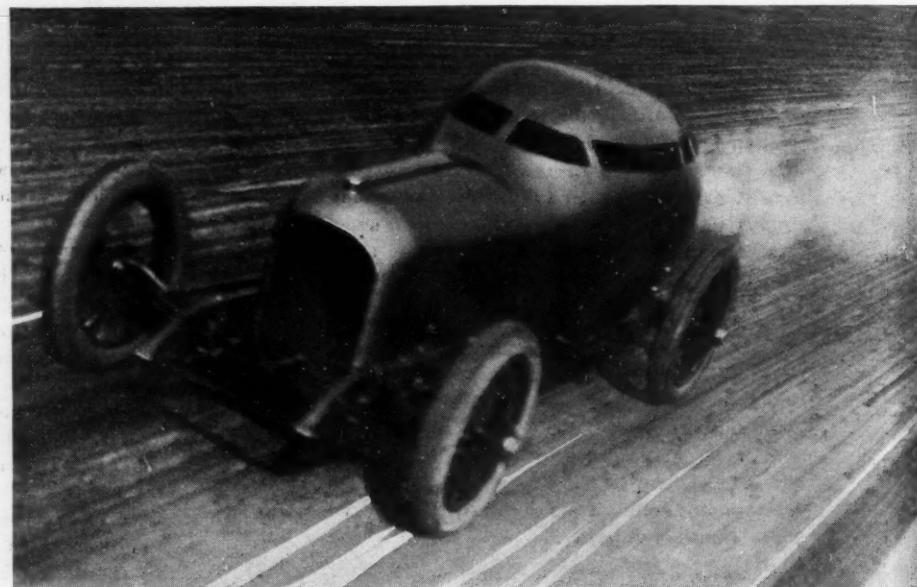
By William K. Gibbs

CHICAGO, June 11—If some of the laps being turned in practice at the Maywood speedway for the June 16 sweepstakes may be taken as a criterion, Chicago's 2-mile track record may be shaded next Saturday afternoon. De Palma has been sending his airplane-motored Packard around the board oval at a speed which proves he will not have to extend his mount to the limit to shatter Aitken's record for American speedways set last year.

Although Resta will not be on the starting line Saturday to defend his title of undefeated champion of the Chicago speedway, the shattering of Aitken's 250-mile record at New York last fall by the winner of the 1917 Chicago race will be interpreted by the majority of racing fans as equivalent to the dethronement of Dario, monarch of the Chicago course.

The three Frontenacs which Chevrolet has toolled and made much faster than when they made their debut last year are looked upon as real contenders in next Saturday's event. Barney Oldfield has just received his freak mount—it has been called everything from a percolator to a U-boat—from the coast and has turned several laps at 102. The car, which is roofed over with aluminum and has port-holes through which Barney will get his only view of the course, is designed to do 125 m.p.h.

Yesterday Earl Cooper showed that his Stutz has all the pep and endurance that it had in previous seasons. He ran an even century in 57 min., 50 sec., averaging 104.04 m.p.h. The course record was set by de Palma last year in competition



Barney Oldfield and his "taxi," which he will drive in the derby at Chicago June 16

during the Grand American race Oct. 16, when he turned 100 miles in 55 min. and 50 sec., later being forced to withdraw.

Thirty-five entries have been made and there are prospects of one more. Eliminations will be run next Thursday when the requisite 90 m.p.h. will have to be made to qualify. It seems unlikely that the eliminations will retire very many of the entries and that there will be a full quota of thirty-two cars, allowed on a 2-mile course under A.A.A. regulations, seems probable.

The amateurs' race, scheduled to begin at noon, will be for 100 miles and there are four Mercers, a Haynes, a Cadillac, a Hudson, a Peerless and a Locomobile slated for

Racers Try Out Their Cars at Better Than 100 M. P. H.

this competition. The track meet will take place at 10 o'clock, the military program at 11 o'clock, the amateur race at noon and the 250-mile professional race at 2 o'clock.

Just to show themselves ambidextrous—that they shine in ways other than on the speedways, the Demon Drivers met the Speedway Club team in a golf match in the oval described by the course last Saturday. The Demon Drivers may still be demons but not at golf, for a drive, a poke and two putts by John G. Campbell of the Speedway Country Club gave him four on the home hole and netted his side a 1 up victory over the Demons, in other words Earl Cooper, Earl DeVore and Fred Waggoner. David F. Reid, president of the Chicago Speedway and Dr. L. O. Green made up the Demons' sparring partners.

The entries for Saturday's race are:

Car	Driver
Ogren	Mason
Ogren	Henning
Delage	Lecain
Delage	Devigne
Delage	Unnamed
Oldfield Special	Oldfield
Pan-American	Alley
Duesenberg	Milton
Duesenberg	Hearne
Duesenberg	Diedrich
Duesenberg	Pete Henderson
Packard	de Palma
Ostewig	Ostewig
Mercedes	Fontaine

(Concluded on page 19)

Perlman Monopoly Over?

Dismissal of Suit Against Firestone Indicates Control of Rim Patents Ended

Motion for Decision Was Made by Plaintiff's Counsel

NEW YORK, June 12—Special telegram—One of the most sensational developments in the history of demountable rim patent litigation took place yesterday, when the suit of the Perlman Rim Corp. against the Firestone Tire & Rubber Co., charging infringement of the Perlman demountable rim patent, was dismissed by Judge Hand without prejudice to either party. Motion for dismissal was made by council for Perlman.

Dismissal of this suit would appear to indicate that the monopoly of the demountable rim situation under Perlman patents is ended. The decree of the court provides that all exhibits of both parties be impounded and that all testimony taken in case just dismissed shall be available for use in any further litigation between these two parties or their representatives. The future policy of the Perlman Rim Corporation in regard to enforcing patents has not yet been termed. It is understood that L. H. Perlman, president, has retired from all connection with the corporation.

Firestone First Defendant

Firestone was defendant in the first suit brought under Perlman patent, following decision of Circuit Court of Appeals February, 1916, affirming decision of District Court of Aug. 18, 1915, which upheld the validity of the patent and declared it infringed by Standard Welding. Suit against Firestone was brought in February, 1917, in the United States District Court for the southern district of New York. Nothing was brought out in the evidence affecting validity of the patent in any way, although Firestone interests state they had much new evidence ready to introduce when the case was dismissed.

Perlman patent No. 1052270 was issued on application filed June 29, 1906, as a continuation of, and substitute of, application filed May 21, 1906. Perlman's idea, he said, was to patent "a wheel whose demountable rim is bodily detachable from its fixed rim and felloe, means being provided for firmly and rigidly retaining the demountable rim and the fixed rim and felloe while in use, such means at the same time being adapted to be manipulated for enabling ready, rapid and easy removal of the demountable rim when desired." The features are use of separating wedge bolt and nut in connection with short stem lug and the provision of air space between fixed and demountable rims.

Suit was filed by L. H. Perlman against the Standard Welding Co., charging infringement, Oct. 7, 1913, in the United

States District Court for the southern district of New York, and a decision was handed down in Perlman's favor by Judge Hunt Aug. 18, 1915. This decision subsequently was upheld by the United States Circuit Court of Appeals for the second circuit in February, 1916. An injunction prohibiting further manufacture and sale of demountable rims by the Standard Welding was issued March 8, 1916.

The Perlman Corp. was formed soon after this with \$10,000,000 capital, and several manufacturers took out licenses under the Perlman patent. Perlman immediately secured a large plant in Jackson, Mich., which now is producing approximately 4,000 daily.

POSTOFFICE RENTS GARAGE

New York, June 11—The postoffice department here is to run its own garage hereafter. The United States government has agreed to pay \$600,000 rent during the next ten years for a garage to house 250 of its mail trucks. The building probably will cost \$300,000 and will have an available floor space of 67,750 sq. ft. Heretofore the postoffice has maintained its trucks in public garages, and this is the first step towards government ownership of such buildings in New York. It is planned to have government garages in other boroughs in the near future.

TO MAKE PRESSED STEEL PARTS

Allendale, Ohio, June 11—The Fostoria Pressed Steel Co. has been organized here for \$100,000 and will make all of the pressed steel parts required by the Allen Motor Co. Officers of the new concern are: Henry Rothrock, president; George E. Kirk, vice-president; E. C. Wolfe, secretary, and C. D. Pifer, treasurer and general manager.

Bijur Loses at Court

NEW YORK, June 11—What probably is the conclusion of the patent infringement litigation between Bijur Motor Lighting Co. and the Eclipse Machine Co., and Vincent-Bendix on the Bendix electric starter drive, was reached to-day when the United States Circuit Court of Appeals upheld the decision of Judge Hazel at Buffalo, last July, which held that the Bendix product does not infringe with the Bijur patent. The case hinged on a claim of Mr. Bendix that he had a contract with the plaintiff to use the patent. He in turn allowed the Eclipse Co. to work under the terms of the contract. The Bijur Co. deny that such a contract existed, but Judge Hazel ruled otherwise.

Bijur took an appeal and to-day's decision is the result. The original case, as well as the present one, attracted much attention on account of the legal talent engaged, which included John B. Stanchfield, George Wickersham, former attorney-general, and E. Henry LaComb, the Thaw counsel, as well as the Chicago firm of Rector, Hibben, Davis and Macauley.

Emerson Will Continue

President States Company Will Produce and Ship Cars Without Reorganization

Receivership of Last Week Only Lasted 48 Hours

NEW YORK, June 12—Special telegram—The Emerson Motors Co., Kingston, N. Y., is not to be re-organized. President Theodore A. Campbell states that the company will continue in operation, that it has plenty of money and will build and ship cars as fast as possible. There are at present about ninety cars assembled and being shipped to dealers. Mr. Campbell says that rumors concerning a re-organization and reduction of capital from \$10,000,000 to \$100,000 are unfounded. The receivership in which the company was placed last week was terminated at end of 48 hrs., following an agreement between stockholders and creditors, because, according to Bainbridge Colby, attorney for the company, the organization is solvent.

CHEVROLET USES LARGER ENGINE

Flint, Mich., June 12—Both the Chevrolet Baby Grand and Royal Mail, touring and roadster respectively, are now equipped with valve-in-the-head engines of 5 1/4-in. stroke, whereas the stroke previously was 4 in. A water pump, driven off the fan belt has been added and the oil pump which formerly was driven off the camshaft is now gear driven. The powerplant unit has been modified. It now is a combination of amidships and the gearset that is a unit with the engine. An emergency brake lever and an independent service brake pedal are installed, replacing the combination service brake. Clutch lever clearance is considerably greater in the new car. Not much change is noted in body design. A one-man top now is stock equipment and the tire size which was 32 by 3 1/2 now is 33 by 4.

MAKER CHANGES NAME

Muskegon, Mich., June 8—The Universal Valveless Four Cycle Motor Co., Grand Rapids, Mich., has decided to change its name to the Muskegon Engine Co. and has purchased a 40-acre tract of land at Muskegon, on which it will erect a large factory immediately. The general offices, formerly at Grand Rapids, and the engineering department at Toledo, Ohio, have been moved to Muskegon. In addition to the line of engines this company will announce soon a new line of motor trucks of 1- and 2-ton capacity. Preliminary arrangements for the manufacture of these new truck models have been under way for some time.

Ad Motorists Meet Jinx

Only Six of Fourteen San Francisco Cars Reach St. Louis

Tour Chairman Blames Late Winter for Poor Record

St. Louis, Mo., June 11—Six of the fourteen cars that left San Francisco late in May to carry advertising men from that city to St. Louis to the thirteenth annual convention of the Associated Advertising Clubs of the World, last week reached here during that meeting. Eight were last heard from in Colorado. None of the cars traveled the entire distance from San Francisco under its own power.

J. A. Houlihan of San Francisco, tour chairman, said that the first break came at Colfax, Cal., where it was learned that the motor road to Truckee, Cal., a Sierra mountain pass, was under 20 ft. of snow. This necessitated a 55-mile rail shipment for all cars. From that point the Chevrolet pilot car which started six days ahead of the others was driven to St. Louis by R. C. Durant. It reached St. Louis Sunday morning.

At Fort Bridger, Wyo., Houlihan said, a conference of the other drivers was held. They had just driven down a 10 per cent grade on which the mud was so deep that they went on low speed with the throttle wide open. The drivers voted to ship from Carter, Wyo., 9 miles from that point, to Denver, 300 miles. Carter was the nearest railroad station and it required 6 hrs. to get there. Some drivers decided not to ship. Those who shipped were: Studebaker cars, driven by Charles Richman and James Gurley; Buick, driven by Harry Hazelton; Studebaker, driven by Abe Bernstein; Auburn, driven by H. F. Schalbach; Pierce-Arrow, driven by Harry Hamilton. These cars reached St. Louis Sunday night, except the Pierce-Arrow, which arrived Monday night.

F. W. A. Vesper of the Vesper-Buick Auto Co. of this city met the tourists at Plainville, Kan., and piloted them to St. Louis. The cars that were not shipped to Denver were heard from last Wednesday and were still in Colorado, "in a sea of mud," the telegram said.

Houlihan says that the trip was undertaken entirely too early for a season notable for a late winter. Snow, sleet, rains, unworked roads and everything except those things desirable for motor car driving were encountered.

ROAD BOOSTERS TO MEET

Colorado Springs, Colo., June 7—The midsummer gathering of the Pike's Peak Ocean-to-Ocean Highway Association will be held July 10-11 on the summit of Pike's

Peak. Sociability runs are being organized in various sections of the country to attend the meeting as well as to provide an enjoyable summer tour for the delegates and their families. Added interest is given by the knowledge that most of the delegates will drive their cars to the summit over the new Pike's Peak motor road, the highest in the world. This road, a perfect mountain boulevard, 20 ft. wide and safe all along its 18 miles, is said to be one of the most remarkable engineering feats in the last decade.

One of the important matters to come before the delegates will be the report of the committee on western extension of the highway from Utah through Nevada and California to the Pacific Coast. National Secretary A. W. Henderson and members of this committee will attend the Utah Division meeting at Duchesne June 12 and investigate the proposed routes. The roads to be inspected are the Overland trail through Northern Nevada into California, the Midland trail and the Arrowhead trail from Salt Lake City to Los Angeles. The committee will also investigate as to whether an entrance into California other than that of the Lincoln highway or the Midland trail is feasible.

N. Y. DRIVERS MUST REGISTER

New York, June 9—After July 1 all operators of motor vehicles in New York will be required to register and obtain certificates from the Secretary of state to permit them to drive. Governor Whitman has signed the Kelly-Cromwell Bill, which makes this necessary.

Under this measure, which has been opposed vigorously by dealers, owners of cars are placed in a class distinct from those who operate cars for pay, in that they will not be required to undergo an examination. They will receive licenses from the secretary of state to drive upon payment of a \$1 fee.

The measure has been supported by the police department of New York state and long has been urged by the secretary of state. Heretofore, neither the police nor the secretary of state have had power to revoke licenses for flagrant violations of the traffic law. Under the terms of the new measure, those who operate cars while intoxicated will be guilty of a misdemeanor and those who injure pedestrians and fail to report the matter to the police or to surrender themselves will be guilty of a felony, punishable by a fine of \$500 or by imprisonment, not to exceed two years, or both. Convictions for these two offenses must be reported to the secretary of state, and upon a recommendation of the trial court, he may suspend the license of the person convicted and has the power to revoke the license. In the case of third offenders, the secretary of state may revoke licenses and no new licenses can be issued for a period of six months after the date of conviction.

April Exports Fall Off

Cars, Trucks and Parts Shipped From New York Drop \$1,000,000

England Took Only Eleven Cars; Russia None

NEW YORK, June 8—April exports of passenger cars, trucks and parts from the New York port fell off \$1,000,000 in April. The total was \$5,447,996, while in March it was \$6,258,549. Passenger cars showed a small gain over the previous month, numbering 3413, valued at \$2,541,844, compared with 3148, valued at \$2,278,090 in March. Parts declined from \$1,669,115 to \$976,281.

England again was the biggest buyer of trucks, taking \$1,290,594 worth, or 418, which was more than half the total truck exports. The next largest foreign buyer was France, which bought 175 trucks, valued at \$406,266. German submarine activities caused England's truck purchases to drop \$600,000.

Nearly a third of the total foreign purchases of passenger cars went to British South Africa, her total being \$715,599 for 1039 cars. The war has had little effect on the money situation in that district, and the banks have a surplus of money. British South Africa is pre-eminently a mining country like Mexico, approximately 60 per cent of its income being derived from the gold, diamond and coal mines.

Australia continues one of the leading buyers of passenger cars, taking 303, worth \$237,355. England only bought eleven cars, valued at \$30,631. France took seventy-three, valued at \$32,109. Not one car went to Russia from this port.

PACKARD MEN TO CRUISE

Detroit, June 9—Four hundred and fifty Packard factory men, dealers and salesmen will sail June 18 for a cruise to Mackinac Island and thence to Sault Ste. Marie and through the locks a short distance into Lake Superior. Twenty-five passenger car salesmen and an equal number of truck salesmen, who have made high selling marks in the Lincoln Highway Sweepstakes sales contest, will be guests of honor on the cruise, which will last three days. In addition, there will be a complete motor car show on board, and during the cruise an organization convention will be conducted.

CLIFTON AGAIN HEADS N. A. C. C.

New York, June 8—More than ninety companies were represented at the record gathering of manufacturers at which Charles Clifton, head of the Pierce-Arrow Motor Car Co., was re-elected president of the National Automobile Chamber of

Commerce. The other officers elected are: Vice-president, Wilfred C. Leland, Cadillac; division vice-presidents, Hugh Chalmers, Chalmers; Windsor T. White, White, and Herbert H. Rice, Oakland; secretary, R. D. Chapin, Hudson; treasurer, George Pope, and general manager, Alfred Reeves.

The members voted \$30,000 of the organization's funds for Liberty Loan bonds and arranged to carry bonds for all employees who wish to subscribe. The matter of having makers construct their cars so that muffler cut-outs cannot be used except with a screw plug or some other device that can be handled only in a shop was referred to a special committee. The report of the export committee, of which Harry W. Ford, Saxon, is chairman, was made.

John F. Dodge of Dodge Bros., Detroit, was elected to the directorate, the others being Hugh Chalmers; R. D. Chapin; C. W. Churchill, Winton; Charles Clifton; J. Walter Drake, Hupp; C. C. Hanch, Studebaker; Wilfred C. Leland; Alvan Macauley, Packard; William E. Metzer, Columbia; R. E. Olds, Reo; Carl H. Pelton, Maxwell; H. H. Rice, Oakland; Windsor T. White; and John N. Willys, Overland.

FORD BRANCH IS SUED

Raleigh, N. C., June 8—An anti-trust suit has been brought in this state against the Ford Motor Co.'s branch in this territory. A summary of the charge is that the Ford company is very restrictive in its contracts with its dealers, does not permit them to sell other cars and insists that they handle only such parts as are manufactured by the Ford company. The Ford company's contention is that it insists upon its dealers selling only Ford parts because they are better than the so-called imitation parts.

It is asserted by the Ford company that its various restrictions and regulations are to promote better service to the public and are not designed to stifle competition, it being maintained by the Ford representative that because of the character of the business, Ford has no real competition. There are about 125 Ford dealers in North Carolina, and 85 per cent of them handle the Ford only.

HARROUN READY TO PRODUCE

Detroit, June 9—The Harroun Motors Corp. will be producing complete cars within two weeks. All of the machinery has been installed and materials have been storing up for several months, and the company is now ready to engage in steady output.

OLD LOZIER CREDITORS MEET

Detroit, June 7—Creditors of the original Lozier Motor Co. are to meet Friday at the office of the referee of bankruptcy. Total receipts from the Lozier company amounted to \$1,055,609, of which \$255,715 remains to be paid.

Trucks Aid Somme Gain

Bad Conditions Limit Work of Armored Cars on the Western Front

Motor Vehicles Protect Advance of Tanks from Aircraft

PARIS, France, May 1—Many erroneous impressions have gone out with regard to the work armored cars have been doing on the French front. So far as light armored cars are concerned there has scarcely been a single case of their being used on the Western front, because the ground is so torn up, due to shell fire, that it is impossible for so large a target as a light armored car to share in maneuvering work. The protection of such cars is very limited even to the smallest ammunition.

This lack of their use on the Western front can scarcely be considered an indication of their lack of usefulness, however. Rather it must be considered a restriction on their use due to unfavorable conditions.

On the other hand, the motor trucks fitted with anti-aircraft guns have been doing steady consistent work all of the time. These trucks are operating in connection with fleets of tanks, protecting the advance of tanks from hostile airplane observation and control fire. These trucks are also assisting in repair work on tanks. Wherever the tanks are the anti-aircraft trucks are near at hand. These trucks are keeping close up behind the Somme advance.

ADVANCE-RUMELY PLANT BUSY

Battle Creek, Mich., June 11—The Advance-Rumely plant in this city is arranging to manufacture \$2,000,000 worth of oil-pull tractors this year. The force of 400 men now employed in the plant will be doubled.

ALL-STONE INDIANA ROAD

Chicago, June 9—A new route between Chicago and Kokomo, Ind., which eliminates the sand road between the Kankakee flats and Rensselaer now makes it easier for the tourist between Chicago and Indianapolis. This route crosses the Lincoln highway at Dyer. Motorists going to Indianapolis may follow this route as far as Wolcott, going directly south from there over the old sand and dirt road, or follow the stone road direct to Kokomo and thence 50 miles into Indianapolis.

CALIFORNIA ECONOMY TEST

Los Angeles, Cal., June 9—The first motor car contest for the summer season in southern California will be a fuel economy run from this city to Yosemite Valley. June 22 has been selected as the starting date. The contest will be open to Los Angeles dealers only. It is a two-day run

to Yosemite and the first night control will be at Fresno. Entries will be divided into three classes, and a silver loving cup will be awarded to the winner in each. The three divisions will be:

1—Four and six-cylinder cars, 1917 models, price \$1,000 or under f. o. b. factory.

2—Four, six or eight-cylinder cars, 1917 model, price not more than \$2,000 nor less than \$1,001, f. o. b. factory.

3—Four, six, eight and twelve-cylinder cars, 1917 model, price \$2,001 and over, f. o. b. factory.

USED CAR SHOW STARTS

Detroit, June 11—The used car show launched by the Detroit Auto Dealers' Association opened Saturday night to large numbers of prospective car owners. Seventeen cars were sold. Sunday morning buyers were on hand at 10 o'clock, when the show opened, and a steady crowd throughout the day produced sales of more than thirty cars.

As fast as the used cars are sold they are replaced with others. All cars have been inspected by a technical committee and are equipped with starters and electric lights. More than 300 are on exhibition. The show will continue for five more days and is open daily from 10 a. m. until 10:30 p. m.

DRIGGS-SEABURY CHANGES TITLE

Sharon, June 9—The Driggs-Seabury Ordnance Co. has acquired all the property and assets of the Savage Arms Co., Utica, N. Y., and has changed its title to Savage Arms Corp. Though the Driggs-Seabury Ordnance Co., which long has held a prominent place in the motor car industry, thus passes out of existence, it will not by any means cease to be a prominent factor in the industry. The company will continue to furnish drop forgings, frames, axles, transmissions and other parts and is laying plans for large extensions to care for increased business.

HILL JOINS STEAMOTOR STAFF

Detroit, June 9—J. M. Hill has joined the executive staff of the new Steamotor-truck Co. of Chicago, organization of which was recently announced in MOTOR AGE. Mr. Hill is widely known in the industry and was at one time the United States commissioner of motor truck transportation for the Panama-Pacific exposition.

APPOINTS TEXAS COMMISSION

Austin, Tex., June 8—The new state highway department will be placed in operation July 1. Governor James E. Ferguson appointed the members of the highway commission a few days ago, Curtis Hancock, Dallas, chairman; T. R. McLean, Mount Pleasant, and H. C. Odle, Meridian. George A. Duren, Corsicana, is state highway engineer.

Under the provisions of the law creating the commission, it will begin receiving license fees July 1. This tax is based upon the horsepower. According to the last census that was taken of cars about three months ago, there are about 205,000 cars in Texas. Based on this number and figuring an average tax of \$10 a car, the state highway commission will receive an annual revenue from this source of more than \$2,000,000, all of which is to be expended in good road construction. The law provides that there shall be returned to each county half of the taxes that it has paid in to the state highway department, the remainder being retained by the commission as a fund for its state work.

NEW MODEL NAPOLEON

Detroit, June 11—The Napoleon Motor Car Co., which is moving to Traverse City, Mich., will manufacture a new model which has 30 hp., four-cylinder, block-cast $3\frac{1}{4}$ by 5 Lycoming engine. The equipment of the car includes a dry disk clutch, Stewart vacuum feed, Zenith carburetor, Connecticut ignition, semi-floating Weston-Mott rear axle, Hyatt roller bearings, and 31 by 4 tires. The wheelbase is 112 in.

Cars Are Short in S. A.

Uruguay Buys in Spite of the Drought, but Dealers Lack Models

Good Roads and Asphalt Streets Make Motoring Favorable

MONTEVIDEO, Uruguay, May 1—General conditions are not favorable in Uruguay, the smallest country in South America, for motor car sales because the very dry weather during the summer months of last November, December and January amounted to a serious drought and nearly ruined many of the cattlemen. Notwithstanding this, the motor car business has been really good; in fact, it has been abnormally good when compared with other lines of merchandise. Sales of American cars would have been much greater during the last season if there had not been a shortage with all dealers owing to transport troubles.

Although the season has been bad it has been good for the motor car in Uruguay in that a good deal of road building

has been pushed. This country leads all others in South America in the good roads movement. Macadam roads are being built all over the country, and all that is needed is a co-ordination of the different roads into a national system. In the cities the old rough stone block pavement which was hard on tires rapidly is giving way to asphalt. With a recurrence of good crops the road situation should materially assist in selling cars.

Each year sees many changes in the industry in Uruguay. In this connection the use of anti-skid chains rapidly is increasing. As yet the farm tractor is not known in Uruguay. Even motor trucks and light delivery wagons are very limited. Gasoline is selling at approximately 50 cents per gallon. Among the American machines which are selling well, many of which are behind in their orders, are Ford, Studebaker, Cadillac, Buick, Maxwell, Dodge, Hupmobile, Jeffery, Overland, National, Regal and a few others. It is surprising how many buyers there are for cars listing from \$1,250 to \$2,500, while general conditions are so unfavorable.

NEW TRACTOR IN SEATTLE

Seattle, Wash., June 7—C. E. Starr, Sedro Woolley, Wash., has invented a new tractor, which is attracting farmers in this state. The tractor does away with chains entirely and uses a full floating rear axle. Friction is avoided by using the ring gear on the outside of the hub, while three small pinions divide the space equally around the driving pinion. The carrying axle is arranged by placing the spring chair partly over the hub instead of several inches distant, toward the center of the axle. This is expected to make the wheel carry the load. The strain on the housing is relieved by the heavy tube axle running through the wheel and connecting a heavy T-iron. Dust-proof housing forms a case for all working parts, and when the plate is removed from the face of the hub housing, all working parts are displayed, the arrangement being simple and easily operated. A company is being formed in Sedro Woolley, and a factory will be erected for the manufacture of this tractor.

REPUBLIC FACTORY IN CALIFORNIA

Alma, Mich., June 9—The Republic Motor Truck Co., of this city will shortly erect an assembly plant at a cost of \$175,000 in some large center in California. The plant will give employment to 300 men. The Republic Motor Truck Co., now turning out 100 trucks per day, is planning to double its capacity within the next few months and to manufacture about 50,000 trucks of two models, one similar to the present Dispatch and the other with a $\frac{3}{4}$ -ton capacity in 1918.

TO TELL OF WARPLANES

New York, June 11—Additional interest is given the Washington meeting of the Society of Automotive Engineers, Monday



Courtesy Harper's Bazar

This building has a chute to carry motor cars upstairs, where they are parked on the rear porches. It is unique in many ways. It has no corners and the balconies are of seaweed. Barcelona claims it

and Tuesday, June 25 and 26, by securing Lieutenant Amaury de La Grange of the French aviation corps to present a paper on war airplanes, their different kinds and duties, for the afternoon of Tuesday, June 26. Lieutenant de La Grange has been sent to this country by the French government to assist the United States in developing airplanes, etc.

Nothing is more important to-day than airplanes. For the war airplanes are needed more than infantry or cavalry. If the United States could send 10,000 trained aviators with airplanes to the Western front it would be possible to drive the Germans out of the air, and this would be one great step in winning the war. With the present handicap in ocean ships, it would be possible to send airplane engines and aviators in quantities to be effective in France, whereas great numbers of infantry would be difficult to transport. Airplanes are needed to-day more than anything else. They are the eyes of the army. America is going to bend every effort in the next year on airplane production.

It is because of this unusual importance of the airplane that the paper of Lieutenant de La Grange will have a special significance to every S.A.E. member. The lieutenant has agreed to talk frankly on the subject. He has been sent by his government to assist in this work, and he realizes that he will have his most potential audience on June 26. The paper of Lieutenant de La Grange, together with that of Wing Commander Seddon from England should provide a fund of information which S.A.E. members have been long waiting to receive.

ACTION LEAVES REDDEN TRUCK

Detroit, June 7—Leslie R. Action, vice-president and treasurer of the Redden Motor Truck Co., has disposed of all of his interests and retired from the company.

TO ADVERTISE ACCESSORIES

New York, June 9—The Motor Accessories Corp., incorporated in Delaware for \$2,000,000, plans to open two branches in every state in the Union to handle nationally advertised accessories for motor cars and trucks. The corporation will sign up one service station in each town, and there will be a branch in New York and one in Chicago with sub-stations in each city. The first plants will be opened in Newark, N. J., with Philadelphia, Buffalo, Pittsburgh, Brooklyn, New York, Denver, Chicago and Detroit following.

The corporation will operate its own plant in Sandusky, Ohio, manufacturing dry cells, grease guns, air pumps and carburetors. Some of the men behind the organization are R. W. Thompson of Thompson, Warren & Pelgram, attorneys; Henry L. Redfield, Brooklyn, real estate; W. Morris Griscom, Philadelphia; and H. F. Vortkamp, formerly with Mayer Carburetor Co., and the Candler Radiator Co.

Workmen Buying Bonds

Makers Take Millions for Company and Factory Subscription—Employees Aid

Detroit, City of Motor Cars, Takes \$50,000,000

DETROIT, June 9—Workers in the motor car and allied trade factories are responding liberally to the employers' appeals for subscription to the Liberty Bond loan. Canvassing of Ford Motor Co. employees is but half completed and returns show subscriptions of \$2,000,000. An army of workers appealing to fellow employees at the Willys-Overland Co. plant at Toledo yesterday resulted in more than 10,000 subscriptions. Henry Leland, president of the Cadillac Motor Car Co., personally appealed to the employees of that concern, and results from half of the factory display subscriptions totaling \$434,000. The returns at the Packard Motor Car Co. showed that, up to last night, 8850 workers had purchased \$589,500 worth of bonds. The Chalmers Motor Co. announced that its employees' subscription of \$100,000 had been over-sold, and that an additional subscription for \$100,000 was made.

Dodge Bros., holding noon-day meetings, has sold more than \$1,500,000 worth of Liberty Bonds to its employees. More than 950 employees of the Northway Motor Co. purchased \$72,050 worth. Workers at the Fisher Body Corp. increased their subscriptions from \$100,000 to \$150,000. Officials of the Detroit Twists Drill Co. have underwritten \$10,000 for their workers, and the Detroit Lubricator Co. subscribed \$25,000. The Aluminum Castings Co. has taken \$40,000, and the Detroit Steel Spring Co. subscribed \$30,000 worth of bonds for employees.

Detroit has subscribed for \$50,000,000 worth of Liberty Bonds, \$17,000,000 more than its quota.

Makers Buy Liberty Loans

South Bend, Ind., June 11—The Studebaker corporation of this city will take \$1,000,000 worth of Liberty Loan bonds. Half will be thrown open to employees in South Bend, Detroit and branches. If the employees should not take half the corporation will take the balance in addition to the \$500,000 it is holding in reserve for itself.

Detroit, June 8—The Liberty Motor Car Co. is promoting the sale of Liberty bonds in a way of its own. The idea is that of

SEE MOTOR AGE

Issue of June 21

For complete and authentic accounts of Chicago Race, June 16.

President Percy Owen and consists of covering the country with reminder cards, which suggest to anyone reading them that it is his duty to buy Liberty bonds. The cards are in two sizes, each having a different message and each to be displayed in a different place. The larger is for store windows and reads: "We Have Bought Liberty Bonds. Have You?" The smaller is for the individual desk and reads: "I have bought a Liberty Bond. Have You?"

Detroit, June 7—Henry Ford personally subscribed to-day to \$5,000,000 worth of Liberty Bonds, and James Couzens subscribed to \$2,000,000 worth. These two subscriptions brought Detroit's total to the point of over subscription by more than \$2,500,000. Dodge Bros. bought \$1,500,000 worth.

MARMON TO VISIT FRANCE

Indianapolis, Ind., June 10—Major Howard C. Marmon has been ordered to France and will depart soon to inspect airplanes in use on the French front with a view to standardizing and co-ordinating the engines of American flyers with those in the French machines. He will be accompanied by a force of workmen and motor experts. It is not expected that Mr. Marmon will remain in France very long. He probably will return at about the time American manufacturers are ready to begin the manufacture of airplanes in large numbers.

TUNING UP FOR CHICAGO

(Concluded from page 14)

Car	Driver
Hudson	Gable
Hudson	Patterson
Hudson	Mulford
Hudson	Vail
Newman-Stutz	Taylor
Newman-Stutz	Taylor
Stutz	Cooper
Mercer	Haines
Mercer	Thomas
Mercer	Unnamed
Frontenac	L. Chevrolet
Frontenac	G. Chevrolet
Frontenac	Boyer
Crawford	M. S. Britt
Crawford	Ewan
Olsen	McBride
Olsen	Unnamed
Johnson	Monahan
Erbs	Burt
Detroit Special	Buzane
Hoskins	Lewis

Prize money will be divided as follows: First, \$8,000; second, \$4,000; third, \$2,000; fourth, \$1,500; fifth, \$1,000; sixth, \$900; seventh, \$800; eighth, \$700; ninth, \$600, and tenth, \$500. In addition the leader at 100 miles will be given \$500 and the leader at 200 miles will be given a like amount. The Champion Ignition Co., Flint, Mich., offers \$350 to the winner if his car is equipped with A-C plugs and \$100 to each finisher A-C equipped.

French Staff Cars Too Costly

Parliament Charges Reckless Extravagance on Part of Touring Section of Army Officials

PARIS, May 19—Charges of reckless extravagance have been leveled in the French Parliament against the touring car section of the French army. It has been proved that the general headquarters staff ordered twenty-six staff cars at an average cost of \$6,522, being a total expenditure of \$169,572. These cars comprised thirteen Panhard-Levassors at \$6,328 each; four Renaults at \$6,994 each; four De Dion-Boutons at \$6,107 each, and five Delaunay-Bellevilles at \$7,032 each. Each car was fitted up with arm chairs and Pullman couches, electric lighting, Astra headlights, Houdaille suspension, Grouvelle heating apparatus, and special mahogany cabinet-work.

Change Official in Charge

The Parliament evidently considered this unnecessary luxury, for although the House refused to vote the reduction of \$20,000,000 asked for on the estimate, it passed a resolution in favor of \$500,000 reduction. In addition, the general who has been in charge of the motor service of the French army for a year has been replaced by a colonel who previously was in charge of the motor services at the front.

All the charges of extravagance are brought against the use of touring cars, and do not touch the truck or tractor service in any way. There are 14,000 touring cars in the service of the French army; about 11,000 of these are with the armies in the field and the remainder attached to various military services at the rear. It is claimed that the maintenance cost of 1751 touring cars, in service at the rear, for a period of nine months, amounted to \$4,455,792. This works out at an average of \$3,000 a year per car for gasoline, oil and grease, tires and spares only.

In attempting to justify this big expenditure, the motor car authorities maintained that there was an error in the estimation of the number of vehicles, and that account should be taken of the 10,000 trucks which were passed through these services from the factories to the various services at the front.

In the debates it was declared that a tractor went every day from Park No. 10 to Nancy in order to bring back a few pieces of ironmongery, while at the same time another truck made the same journey daily in order to bring back a few eatables for the officers' mess. At Chalons fifteen tractors came in every evening with motor car officers to receive orders which could have been given equally as well by tele-

phone. An officer in the motor service who denounced the waste was brought before a court martial and sentenced to fifteen days' imprisonment at hard labor. As the reward of seventeen years' army service and eleven campaigns he had been proposed for the Legion of Honor, but this decoration was withdrawn.

A number of cars were requisitioned at the Rochet-Schneider factory, kept in the open air for several months, and then returned to the factory. The factory refused to accept damaged cars in the place of the new ones they had delivered, and when questions were asked at the Chamber of Deputies it was stated that these cars had been requisitioned as a punishment to the Rochet-Schneider Co. for having built private cars with military labor. Parliament, however, refused to admit requisitions as a mode of punishment, and the officer responsible for this act was removed.

The greatest abuse arises from the fact that every army officer of any standing considers it necessary for him to have the use of a motor car, and wherever possible, to have one particular car and driver always at his disposal. Officers get into the habit of acting as if the cars were their own private property; competition is developed, each officer wanting the best machine and the finest collection of accessories. In some cases a unit has eighty or ninety cars in use, but when a car is wanted for general service the sub-officer is unable to supply one, for every machine is the property of some officer.

Maintained Own Cars

Before the war every person holding ministerial office under the government maintained his car out of his own funds. When the government removed to Bordeaux in September, 1914, cars could not be hired in that town, and the army was obliged to place a car and a military chauffeur at the disposal of each minister. On returning to Paris this practice continued. As an instance, one famous race driver was for months doing taxi-service in Paris at the wheel of a military car used by a civilian member of the government. This is only one of hundreds of such incidents.

The abuse in the use of touring cars is not confined to the French army. It is a natural growth which has to be guarded against in all military formations, for every person in authority considers that it is impossible for him to carry out his functions unless he has the use of a car,

and when he has obtained the use of a car he endeavors to hold it exclusively for his own services.

The only remedy is to refuse to allow any officer, no matter what his rank, to have a personal car. Motor cars must be attached to a particular unit and employed for the general benefit of that unit. In addition, every driver must have a pass book in which all trips are recorded, the persons carried, and the reason for the trip. These pass books exist, but under the old system they were never filled, and when government inspectors were sent out every obstacle was put in the way of their getting information.

More Stringent Measures Applied

Since the scandals have been revealed and discussed in Parliament much more stringent measures have been applied both in the army zone and in the interior. In the Paris camp, for instance, military police are now on duty at every city gate with orders to stop all army cars and ask for justification of the journey they are on. It has not been attempted to lay down hard and fast rules regarding the use of cars, for it is estimated that in some cases a car journey is justified even between towns having a good railroad connection, but it has been decided to take it out of the power of any individual officer to decide that he shall use a car because he considers the car is his own property or because he prefers traveling by road rather than by rail. The experience of France in this connection will be valuable in America, for it is certain that with the formation of an army there will grow up an exaggerated demand for touring cars on the part of officers who could do their work just as well either by train, trolley car or afoot.

Another abuse which has been brought to light is in connection with spare parts. Owing to 1600 mechanics having been withdrawn from the front to be placed in the factories, 2500 cars have had to be returned to the rear for repairs which were normally carried out in the repair parks at the front. In this connection it was declared that the factories did not like to undertake repair work nor to make spare parts. In consequence, instead of getting spares from the respective factories, the army now has to make them itself. It was declared that at one aviation school the pupils were dismounting practically new engines in order to get spare parts which the factories refused to supply.

Answers Call for Army Vehicles

Motor Industry Bids for Contracts to Supply Military Cars and Trucks to Government

CHICAGO, June 11 — Motor car and truck manufacturers responded nobly to the call of Uncle Sam for military vehicles as evidenced by the bids which were opened Friday, yesterday and to-day by Colonel Niskern of the Central Department, Quartermaster's Corps. Bids for the entire vehicle equipment of the United States Army for which the government called on all manufacturers three weeks ago were submitted to the Chicago depot of the Quartermaster's Department in response to the War Department's advertisement of May 10, 12 and 17.

Passenger car makers to the number of fifty-nine offered bids on two- and five-passenger cars. Bids ranged all the way from \$420 for the little Saxon up to \$4,500 for the \$5,000 Locomobile. Most of the manufacturers cut their prices approximately 25 per cent to the Government.

Interest in Trucks

It was in the opening of the offerings of the 1½-ton and 3-ton trucks that the most interest was shown, because these bids were called for originally on the army's standard specifications, which were drawn up with the assistance of the standards committee of the Society of Automotive Engineers. The standard specifications depart to such an extent from the specifications of the manufacturers, as the trucks are built for commercial use, that few, if any, manufacturers could promise early delivery on the type A and type B units as the 1½-ton and 3-ton government specifications trucks are classified. Consequently, word was sent out from the Quartermaster's Department that bids would be received on immediate or early delivery on trucks in quantities according to the manufacturers' own specifications.

There were eighty-three bids on trucks of these two capacities, submitted by eighty-one different manufacturers, most of them bidding on their own specifications

but many of them setting a figure at which they could manufacture according to government specifications within from two to four months.

On the light delivery truck of ½-, ¾- and 1-ton capacity, the bidding was not so heavy. Thirty-three manufacturers offered to build the lighter vehicles, and in addition, four makers of truck-forming attachments offered to submit either the attachments alone or Fords or Dodges formed into trucks in varying quantities and immediate delivery up to three months.

Plans of the War Department, so far as the awarding of contracts is concerned, are not announced as yet. In fact, at the central depot here, the instructions regarding the bids, according to Lieutenant Ecker, are to make a digest of the bids and forward them to Washington for disposal at headquarters. Whether the contracts will be awarded from Washington or Chicago is not known. There were a number of bids received after the set time of opening. They were not opened.

Manufacturers as a whole cut their prices quite considerably in the government bid, both on account of patriotic reasons and because quantity orders were anticipated. Anticipation of increasing prices affected many of the offers. Packard, for instance, set the date of Aug. 10 as the time after which it would have to accept contracts at a considerable increase. Other concerns made a price on deliveries up to Jan. 1, approximately 10 per cent lower than deliveries after that date. Other manufacturers put in a clause stating that their price was based on current material and part costs and would have to be increased in proportion as the costs increased. This averaged 10 per cent.

Many of the manufacturers took it into consideration by offering to build a truck to government specifications at a flat rate

of cost plus a per cent. Willys-Overland offered to manufacture at cost plus 15 per cent and most of the others made their figures cost plus 10 per cent. Some of the concerns offered to turn over their plant, wholly or in major proportion, to the government for truck manufacture. J. C. Wilson Co., for instance, offered to turn over 75 per cent of its capacity for government production at a cost-plus-10-per-cent basis and stated it could turn out 6400 per year. Denby Motor Truck Co. placed its entire production of 200 per month at the disposal of the government on four months' notice.

The Four-Wheel Drive Co., Clintonville, offered to license other manufacturers to use its four-drive patent on government work.

Unusual Requests

Some unusual requests were brought to light in the matter of suggestions for government control of supplies, as for instance, that of Charles E. Reiss & Co., who made a proviso in their contract that the government guarantee delivery of parts. Some of the big offers included those of Velie, which bid on any number up to 5000; General Motors, 1000; Nash, 5000 and 500 per month after the first year; Stegeman, 2000; J. C. Wilson, 4800; Willys-Overland, 10,000 at the rate of 500 per month on the big trucks, and fifteen per day on the small ones. Studebaker is prepared to furnish 1200.

The lighter trucks were offered both with bodies and without, but there was a special call for government specification bodies for type A and type B trucks, and there were nearly 100 body manufacturers who made bids on service bodies with or without their canvas covers, which ran from \$200 to \$350 in price and were offered in large lots such as that of the J. D. Brill Co., which said it was able to furnish 21,000 in the first year.

BIDS FOR PASSENGER CARS FOR U. S. ARMY

Opened June 8, 1917

MAKER	RATE OF DELIVERY	FOURS		MAKER	RATE OF DELIVERY	MODEL	LIST PRICE	NET PRICE
		MODEL	PRICE					
Harroun	25 per day	Military roadster	752.00	Overland	100 per day	B5-B-4	895	760.65
Harroun	25 per day	Touring	667.25	Overland	10 per day	85-B-4 roadster	895	748.00
		After Nov. 1—		Willys-Knight	10 per day	88-4	1,395	1,185.75
		Military road..	852.00	Willys-Knight	25 per day	89-4	1,395	1,175.00
		Touring	767.35	Scripps-Booth	100 per week	4	935	794.95
Monitor	15 per week	5-passenger	895	Dodge	100 per day	5-pass. touring..	835	735.00
Reo	15 per day	Roadster	875	Dodge	100 per day	2-pass. roadster.	835	735.00
Reo		S	875	Buick	E-35			795.00
Empire	8 per day	50	1,125	Crow-Elkhart	150 per month	CE-35	845	760.50
Empire		51	1,125	Studebaker	625 per month	4 touring..	985	738.75
Inter State	1 per day	5-passenger	925	Studebaker	325 per month	4 roadster..	985	738.75
Inter State	1 per day	Roadster	925	Moline	100 per month	4	1,495	1,270.00
Monroe	250 per month	M-4	1,095	Briscoe	4		845	725.00
Monroe		M-3	565	F. F. Stearns	50 per month	4	1,495	1,260.00
			450.00	Saxon	40 per day	2-passenger ..	495	420.25

MAKER	RATE OF DELIVERY	SIXES		LIST PRICE	NET PRICE	MAKER	RATE OF DELIVERY	MODEL	LIST PRICE	NET PRICE
		MODEL	PRICE							
Monitor	15 per week	5-passenger	1,095	1,095.00		King	After Oct. 15			
Marmon	100 in 40 days	6	3,050	2,480.00			cost plus fixed charges plus 10 per cent.			
Westcott	100 per month	6-touring	1,790	1,432.00		Cadillac	20 per day	8	2,240	2,097.50
Reo		6-M	1,250	1,200.00		Cole	200 per month	8	1,795	1,525.00*
Reo		6-N	1,250	1,200.00		F. F. Stearns		8	After Jan. 1	1,695.00*
Moon	20 per week	6	1,750	1,500.00		National	AK-12		2,250	1,800.00
Velle	5 per day	6-27	1,650	1,227.50		Packard	100 per month	12	2,250	1,968.75
Jordan	25 per week	6 (250)	1,795	1,400.00					3,050	2,592.00
		After Sept. 1		1,475.00						
Empire	8 per day	70-A	1,285	925.00						
Kissel	20 per day	6-touring	1,295	1,050.00						
Kissel	20 per day	6-roadster	1,295	1,050.00						
Franklin	50 per week	6	1,950	1,560.00						
General Motors	250 per month	Oakland 6	875	850.00						
National	50 per month	A-6	1,850	1,618.75						
Bartholomew	50 per month	Glide 6-40	1,295	1,000.00						
Lexington	25 per day		1,285	1,285.00						
Grant	25 per month	K-6	805	657.00						
		After Aug. 1—								
		G-6	805	755.00						
Marion-Handley	100 per month	5-passenger	1,350	1,140.00						
Marion-Handley		7-passenger	1,650	1,650.00						
Mitchell	50 per day	D-540	1,195	875.00						
Chandler	25 per month	6	1,595	1,295.00						
Haynes	100 per month	6 5-passenger	1,595	1,355.75						
Haynes	100 per month	6	1,725	1,466.25						
Anderson	100 per month	6	1,295	906.50						
Chalmers	10 per day	5-touring	1,250							
Chalmers	10 per day	Roadster	1,250							
Chalmers	10 per day	7-pass. touring	1,095.00							
Columbia Motor.	30 per day	6	1,250	1,180.00						
Buick		E-49	1,385	1,495.00						
Mitchell	50 per day	6 B-40	1,195	875.00						
Patterson	3 per day	6 C-42	1,425	1,094.00						
Elgin	125 per month	5-passenger	1,165							
Studebaker	1,000 per month	Touring	1,250	937.50						
Studebaker	300 per month	Roadster	1,250	937.50						
Davis		6 H.	1,295	961.25 ¹						
Davis		6 I.	1,295	961.25 ¹						
Davis		6 J.	1,595	1,196.25 ¹						
Apperson	5 per day	6	1,850	1,432.00						
McFarlan	4 per month	6	3,800	2,450.00						
Singer	12 per month	5-passenger	3,800	2,575.00						
(Claims this to be actual cost.)										
Locomobile	100 per month	6	5,000	4,500.00						
		EIGHTS AND TWELVES								
Lewis T'1 & Mch.	5 per day	8		948.00						
Knight	5 per day	88-8	1,950	1,667.50						
King	10 per day	8 7-passenger		1,250.00						
King	10 per day	8 3-passenger		1,250.00						

BIDS ON 1 TO 200 U. S. ARMY TRUCKS

1/2-ton, 3/4-ton and 1-ton—Opened June 11, 1917

Maker	DELIVERY			PRICES	1-ton	Maker	DELIVERY			PRICES	
	Begin	Monthly	1/2-ton	3/4-ton	1-ton		Begin	Monthly	1/2-ton	3/4-ton	1-ton
Metropolitan Motors, Inc.	30 days	40		\$ 895.00		Martin Truck & Body Co.	Immed.	10 up	900.00		
Bethlehem Motors	10 days					Brinton M. T. Co.		25		Body extra, total	400
Norwalk	30 days	75		1,135.00		I. H. C.	10 days	80		Chassis only	1,125.00
Economy	30 days	25	\$ 708.75			Commerce M. C. Co.	7-1	60		Body extra	
Commercial Vehicle M-	2 days		745.00			Republic		50			1,240.00
Seneca		75	643.00			Federal					1,350.00
Commerce Motor Car Co.			Bidding on 1000, no price			Reo	30 days	200		Or, cost plus 10%	1,485.00
Forschier Motor Truck Co.	7-19	4	1,625.00	1,825.00		Dineen	Immed.		Model 10 chassis, \$1,289; body, \$225		
Maxwell				795.00		Rainier			Model 12 chassis, \$860; body, \$150		
Superior Motor Truck Co.	10 days	20		1,250.00		Collier M. T. Co.	4 months	50		Chassis only, body extra	
Vlm	6-20		875.00			Hudson			900.00		
Koehler	Immed.	20		1,075.00						After Jan. 1, \$1,000	
Beck M. T. Co.	60 days	12		1,080.00							
Packard			Total 150								
Henney		10 days	3								
Studebaker			663.75								
Garford	3 weeks	100		1,657.50							
Selden Truck Sales		25									
Willys-Overland	24 hours	375	722.50								
Lippard-Stewart	2 weeks	..	1,140.00	1,740.00	2,250.00						
Abbott & Downing		5									
Nash Motors Co.	30 days	200									
Rush Co.	30 days	50	750.00								
				Body extra							

BIDS ON TYPE A AND TYPE B ARMY CHASSIS

1 to 3,500 Each, 1 1/2-Ton and 3-Ton, Opened June 10

Maker	DELIVERY			PRICES	1-ton	Maker	DELIVERY			PRICES						
	Begin	Monthly	Total				1 1/2-ton	A Body	3-ton		1 1/2-ton	A Body	3-ton	B Body		
Dayton M. T. Co.	3 days	12	350			Dort	30 days	100		2,975*						
Bowling Green			2000	\$ 2,785		Kelly-Springfield	Jan. 1	280		2,600*			3,442*			
Moreland		200	550	2,250*	\$ 200	Kelly-Springfield	Jan. 1	280		3,090†			3,590‡			
Corbitt M. T. Co.		10		2,500*		Norwalk M. Co.							2,860			
Selden	30 days	100	1500	2,807		King M. Co.										
Master T. Co.	5 days	100		2,390§		Grove M. T. Co.	Oct. 1			1,786*						
Burford, Ltd.	Immed.	100	2300	2,463*		Pierce-Arrow	Sept.	100-300	800	3,500*			4,300*			
Oneida M. T. Co.	July 10	5	45	1,855		Pierce-Arrow	Jan. 1	250		3,800†						
White	July 1	200	5725	3,150*		B. & M. Truck Co.		100	3000	3,100†						
Signal	August			2,300*		Staver Carriage C.				2,325*			3,950‡			
Bourne Magnetic	August	25	450	2,750*		Winther	Aug. 5		2500	2,850†						
Schacht	Aug. 15	25		2,650*		Gramm-Bernstein	July	66	759	2,790†			3,100‡			
Tower M. T. Co.		25		1,640		Federal M. T. Co.		100	5000	2,700*	205		2,563*	336		
Tractor Prod. Co. (F-W-D)						Velie	30 days			3,750*	255					

Maker	DELIVERY			PRICES			Maker	DELIVERY			PRICES			
	Begin	Monthly	Total	1½-ton	A Body	3-ton		Begin	Monthly	Total	1½-ton	A Body	3-ton	B Body
Fageol	...	100	3,500†	...	4,500†	...	United Motors Co.	30 days	25	...	2,300*	...	2,870*	...
Republic M. T. Co.	Aug. 10	3300	2,020‡	255	2,575‡	288	United F. W. D. T. Corp.	Sept.	20 up	...	3,250 or cost plus 10%	...	3,375‡	...
Garford	July	100	1050	2,730	255	3,537	Indiana T. Co.	...	50	...	2,562	...	3,236	...
Brockway M. T. Co.	...	1492	2,975†	255	3,872†	295	Willys-Overland	...	500	10000	Cost plus 15%	...	...	...
H. E. Wilcox	Sept. 29	75	...	2,200*	...	...	Bethlehem Motors	45 days	100 up	5000	2,175	190	3,900*	...
Wichita Falls M. T. Co.	...	5	100	2,950†	...	3,800‡	Hurlburt	...	...	2,350†	...	4,250‡	...	
Kissel M. T. Co.	4 months	150	...	2,627†	...	...	Rowe	...	500	2,595	1	3,871‡	1	
Kissel M. T. Co.	...	75	...	2,100*	...	...	Locomobile	Immed.	100 up	...	...	4,379‡	1	
Atchison M. T. Co.	...	50	750	2,400*	...	2,900*	International M. C. Service	60 days	100	...	2,900†	235	4,175‡	...
Moon M. C. Co.	...	50	500	2,550†	285	...	Clyde Car Co.	30 days	1000	2600	2,465*	...	3,290	...
Gen'l M. T. Co.	Immed.	...	1000	2,390*	...	3,140*	Beck M. T. Co.	60 days	12	...	1,950*	...	...	...
Dorril M. C. Co.	Oct. 10	10	750	2,443*	...	...	Dineen M. T. Co.	90 days	25 up	...	2,996*	...	...	...
Sandow	Sept. 1	20	300	...	2,983	...	Packard M. C. Co.	...	500	3000	3,474†	1	4,125‡	1
Reo	30 days	75	...	1,485*	144	...	Packard M. C. Co.	...	...	3,082	1	3,536	1	
Pullmore M. T. Co.	...	25	300	...	3,000	...	Packard M. C. Co.	...	...	2,803	...	3,364	...	
Consolidated	July	585	2,155*	375	...	...	Note—Govt. spec. with certain exceptions.	...	...	...	...	...	...
Consolidated	...	600	2,250†	...	...	...	Atterbury	...	40	500	...	...	3,500‡	...
Bessemer M. T. Co.	...	225	...	2,325*	...	3,313‡	Acme	...	50	600	...	...	3,000‡	...
Bessemer M. T. Co.	...	...	...	2,413†	...	...	Noble (Kendallville, Ind.)	...	50	2,100*	...	...	...	...
Lippard-Stewart	...	70	...	2,237	250	...	Transport Tr. Co.	...	8½	100	...	...	4,380‡	...
Lippard-Stewart	...	...	...	3,300†	...	...	J. Cunningham's Sons Co.	Jan. 1	50	200	...	...	3,000	...
Stewart M. T. Co.	July	100	600	1,785*	...	...	Strand	...	250	...	...	...	...	...
Forschler	July	5	...	2,055	...	...	Peterson Co.	...	10	100	...	...	...	...
Hewitt-Ludlow	...	4	...	2,850*	...	3,950*	Note—*Bidding on makers' specifications.	...	...	...	...	...	...	...
Standard M. T. Co.	...	125	...	Cost plus 10%)	...	3,500‡	†Bidding on government type A military truck.	...	...	...	...	...	...	...
Chas. P. Reiss Co. (F-W-D)	...	100	(Govt. to guar. parts)	...	...	...	‡Bidding on government type B military truck.	...	...	...	...	...	...	...
Nash Motors Co.	45 days	250	5000	2,465	...	...	§Bidding on makers' specification, extra charge for steel wheels.	...	...	...	...	...	...	...
F-W-D	July 1	120	910 (Govt. spec., 4m.)	3,200*	...	...	¶With body.	...	...	...	...	...	...	...
Stegeman	...	100	2000	2,515†	...	2,945‡	...	...	...	...	...	...	...	...
Whit-Will	...	...	12	2,300*	...	...	...	...	...	...	...	...	...	...
Diamond-T	Immed.	250	975	2,125	...	2,965	...	...	...	...	...	...	...	...
Day-Elder	...	...	...	1,200*	...	1,687*	...	...	...	...	...	...	...	...
O. Armleder	60 days	75	...	2,150*	...	2,900*	...	...	...	...	...	...	...	...
Denby M. T. Co.	Aug. 1	200	1050	2,425*	...	...	...	...	...	...	...	...	...	...
J. C. Wilcox	90 days	400	4800	2,915*	...	...	...	...	...	...	...	...	...	...
Sullivan M. Corp.	...	150	...	2,200*	...	3,058*	...	...	...	...	...	...	...	...
Maccar	40 days	10	...	2,350*	...	3,400*	...	...	...	...	...	...	...	...
Hannay Motors	...	2	3700	...	...	...	...	...	...	...	...	...	...	...

Value of Mechanical Traction in War

WASHINGTON, D. C., June 11—The use of mechanical traction, considered one of the most important adjuncts to the present war, whether tractors are used for transportation of troops, supplies, guns, munitions of war or for the tilling of the soil, is now being given the closest study by the Tractor Standards Division of the Society of Automotive Engineers. The extent to which mechanical traction is to be used in these various capacities, and the value of such use to the nation in time of war, according to Coker F. Clarkson, General Manager, Society of Automotive Engineers, can hardly be estimated at this time.

Mr. Clarkson, discussing this question, called attention to the development in this country of the first completely motorized field artillery battery, successful experiments with this battery having been made in work at Fort Sill, Okla. Speaking further along these lines, Mr. Clarkson said:

"The great probability of the farm tractor in the solution of the world's food problem is, of course, widely appreciated, but many points, however, are involved at this time in the adequate production and use of farm tractors. In the nature of a starting point, it is the fact that the average farmer does not understand sufficiently the merit of the tractor as a tool for him and is not trained as he should be in operation of the mechanical apparatus. Any machinery ever produced requires some attention at regular intervals.

"There are well known cases of tractors which have failed in the hands of some owners, and have been highly successful in the service of owners who have some adequate knowledge of the attention actually required by the machines. The agriculture press is rendering a national service of the highest value in making plain the requirements that can be met easily by reasonable effort in the forward march of intelligent modern farming.

"There is no manner of doubt that a great deal of tractor development, as an immediate result of military activities, is at hand and in sight. The most spectacular feature of this development is the military work, but

the production of crops in greatly increased quantities is a consideration second to none in the national welfare. The work of the Society of Automotive Engineers applies at many points of contact, and the result that will be achieved by it through well organized proceedings now in effect will be as important and striking as any with which this remarkable organization is to be credited.

"There are many logical reasons in favor of the substitution of motor-driven apparatus for horses in the marshalling of field guns. Horses of the type required are becoming more and more scarce and costly. It has been established that certain types of ground, difficult to negotiate, can be covered by the use of tractors when this would be impossible with horses.

"The tractor, as a whole, is in one sense more vulnerable to gun fire than a field artillery team of eight horses; on the other hand, the tractor can work longer and be repaired within shorter time than is required generally for a horse to recover from any ailment. Sentimental reasons, of course, are in favor of the horse being emancipated from the frequently heavy work of gun haulage. It seems very likely that greater development of tractors of the military type will redound to the benefit of the commercial users tractors.

"The use of tractors in the European war was based very largely upon commercial development of American engineering products, and since the war American engineers have forged ahead and will undoubtedly bring about increasingly gratifying results at an early date."

TRACTORS AFTER WAR MATERIALS

Washington, D. C., June 11.—The situation with respect to an increased use of farm tractors as a decidedly important step towards the successful prosecution of the war in the way of supplying foodstuffs for the army and to aid the United States in helping to feed its Allied countries has improved recently to a slight extent, according to Dr. B. F. Galloway, assistant to the Secretary of Agriculture, but the desired improvement is not expected by Dr. Galloway until the more immediately pressing matters of war organization, taking in the question of munitions, etc., have been more fully taken care of.

This means that the raw material nec-

essary in turning out tractors for farm use cannot be obtained until the other demands have been met, at least in great part.

Arnold P. Yerkes, of the farm management department of the Department of Agriculture, who has on file in his office detailed information touching the number of farm tractors now actually owned by operators of farms and who is in close touch with the extent to which these tractors are being utilized, expressed the view that the only thing to do at present, aside from increasing the hours per week tractors are operated, is for all influences actively interested in this proposition to work to the end that the manufacturers of tractors may be able to get sufficient quantities of raw material to enable them to supply in part at least the demand for the tractors.

Mr. Yerkes said the introduction of tractors into farm work is not by any means, as many seem to think, confined to the middle western and other western states. He said tractors are now in use to a gratifying extent in the more eastern states; that states, for instance, like Pennsylvania and others are using them in large numbers.

With the assistance of H. L. Horning, now connected with the farm and ordnance tractor division of the government in an important advisory committee, due to his extensive knowledge of the situation, it is hoped that marked improvement in the time of operation of farm tractors, together with a possible increased output at the factories, will result. In fact, this already has resulted to an extent, with hopes for the immediate future.

Cars of Future to Use New Fuel?

Gas Engine Makers Discuss Kerosene—Paper on Holley Vaporizer Sees Straight Cut as Coming Power for Passenger Vehicles

CHICAGO, June 7—The possibility of using for all power purposes where gasoline is now employed, a fuel in which kerosene and other lower grade distillates are incorporated, was the chief feature of interest in discussions arising from the tenth annual convention of National Gas Engine Association at the Hotel Sherman, yesterday and to-day. Don T. Hastings, chief engineer Holley Bros. Co., made the suggestion that the most logical method of utilizing available fuel supplies for motor cars and other internal combustion engines was by the use of a "straight cut fuel." By this is meant permitting the distillation from the crude to run until the distillate reaches a boiling point of 600 deg. F. thus including present-day gasoline, naphtha, kerosene and so on in the same run instead of cutting at lower boiling points for gasoline and marketing the higher boiling point products separately as kerosene, etc.

On Market Here Soon

This proposition was favorably discussed by many of the gas engineers present, particularly by President Bement. It is impossible, however, to get an expression of opinion from the oil men on the subject. Hastings' suggestion came about in the discussion of his paper on the Holley vaporizing system for the use of heavy liquid fuels in which he described the Holley vaporizers which are now in service on Ford cars and Ford tractors in England, and which will be on the market shortly in America on Ford products and also in other sizes for cars of other makes. This vaporizer has been described in earlier issues of *MOTOR AGE* and is again illustrated and described in a reproduction of Hastings' paper on these pages.

Hastings also described the construction and operation of the Holley air washer, which has been developed for tractor use to remove dust from the air.

The paper concluded with a statement that while the Holley vaporizer has been developed with the idea of using kerosene as fuel, it is not the belief that kerosene will ever be used to any extent by passenger cars. For their use a fuel will be developed which will contain more and more of the higher boiling point fractions which now constitute kerosene; in other words, that the fuel of the near future for passenger cars will approach the straight cut fuel; that is, all of those fractions of petroleum below an end point of 600 deg. F., will be combined into the future motor fuel. A curve on these pages shows the comparative distillation of the straight cut fuel, with English gasoline, kerosene, distillate, and American gasoline.

In the discussion of the Hastings paper, former estimates of the power of kerosene were confirmed by the statement that kerosene as a fuel, produced approximately 80 per cent as much power per gallon as gasoline. This chiefly is due to the lower volumetric efficiency occasioned by the necessity of heating the kerosene to such a high point for vaporization.

George Briggs of Wheeler & Schebler, Indianapolis, Ind., mentioned an instance in which government tests had shown as high efficiency per pound of kerosene as gasoline in an engine in which the temperature of the fuel was lowered, just before ignition, by the introduction of a shell of cold air just inside the cylinder wall.

Mr. Hastings said that the Holley vaporizing system as marketed for Fords in service would comprise a new cylinder head, giving lower compression and better circulation of water than is obtained with the Ford for gasoline and that this is now being supplied by the Ford company for export service. He stated that the Holley company now had the contract with the British government for from 5000 to 6000 kerosene vaporizers and that these would be on the market in America within from one to three months.

Use of kerosene for internal combustion engines was the chief subject of discussion among the gas engine makers. There were two other papers on this subject, both of the latter, however, applying only to stationary units. One of these was "A Kerosene Carburetor," by Theo. C. Menges, Associate Mfg. Co., and the other "The Carburetion of Kerosene," by W. G. Clark, the Wilcox Bennet Carburetor Co.

Other papers of interest to the stationary engineers in particular, were given at the meeting.

The Holley Vaporizer

By Don T. Hastings

MEET us half way to avoid a tremendous shortage of gasoline for motor vehicles in 1919, or after the war, by devising carburetors to handle a wider range of fuels."

This appeal to the automotive industries by the American Chemical Society, at its recent annual meeting, fairly represents the attitude of those connected with the production of motor car fuels.

The annual production of petroleum is by no means keeping pace with the consumption. The figures for 1916 show an actual slight decrease over those for 1915, and in addition to this, the exportation of gasoline and other petroleum products showed a substantial increase; the net result being that the supply of petroleum available for this country was 7,000,000 barrels less than the preceding year. At the same time the number of users of the lighter petroleum products has increased with extraordinary rapidity.

The available supply of so-called gasoline has been substantially increased by the various cracking processes, the manufacture of casing-head gasoline, and the production of gasolines which include in some cases part of the kerosene fraction of petroleum. In spite of these increases, however, it is clearly evident that the demand will far exceed the supply, unless the automotive industries take prompt action along the lines indicated in the American Chemical Society appeal.

The Answer

The Holley vaporizing system presents an answer to this fuel problem, by allowing the satisfactory use in internal combustion engines of kerosene, distillate, benzol, gasoline or any liquid hydro-carbon fuel whose final boiling point is not over 600 deg. F.

This Holley vaporizing system has been in process of development for some three years and has been tested in service sufficiently to prove it satisfactory commercially. The system consists, for tractors and trucks in government service, of the heavy fuel vaporizer proper, and an air washer. The necessity of some efficient means of removing dust from the air entering the engine cylinders has been deeply impressed on all those who have been working with tractors in the field, or with trucks in the government service on the Mexican border. For trucks in ordinary service, motor boats and passenger cars, the Holley vaporizer alone is necessary.

The Holley Vaporizer

The Holley vaporizer utilizes heavy fuels by heating a mixture of the fuel with a small quantity of air to the point where it is in a suitable state for the addition of the large quantity of air necessary to form the desired explosive mixture. This mixture, of fuel and primary air, is far too rich to support combustion, so that it may travel through a highly-heated passage without danger of igniting. The rich mixture is at a temperature of 300 to 350 deg. F. before it is diluted by the main air supply. The temperature of the resulting mixture, delivered to the engine cylinders, ranges from 160 to 225 deg. F., depending on operating conditions.

Starting is accomplished by the use of gaso-

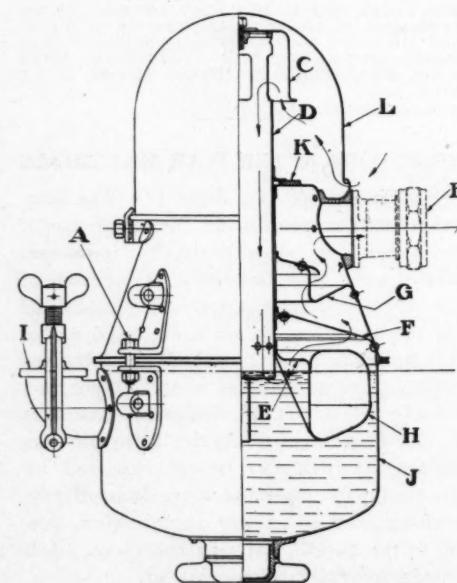


Diagram of Holley air washer

line when the engine is cold, but when the engine is still reasonably warm from previous operation, it can be re-started on kerosene without trouble.

To avoid pounding with the ordinary engine, it is found necessary to reduce the compression when using kerosene, 15 to 20 lbs. below that used with present-day gasoline. There is no doubt that this reduction in compression can be avoided by refinement in design of the walls of compression spaces in engines, including the tops of the pistons. This has been demonstrated conclusively by the work reported during the past year by Mr. Horning of the Waukesha Motor Co. The injection of water, in the proper amount, is also of material assistance in eliminating this objectionable pounding.

The Holley Air Washer

The Holley air washer was developed in response to the demand for an efficient means of removing dust suspended in the air in the fields or on the road. It consists essentially of a tank containing a quantity of water through which the air entering the engine cylinders is forced to pass. In detail the washer consists of a tank, J, carrying the water, above which is supported by a suitable float, H, the tube, D, through which the air enters the washer. The lower end of this tube dips beneath the surface of the water about $\frac{1}{4}$ in., this depth of immersion being maintained by the float as the water is exhausted from the air washer. Above the float is arranged a series of baffles, F, G, which prevents any large drops of water from passing out of the washer with the air. The top of the float tube is provided with a cap, C, which prevents any chunks of dirt entering the tube, and also acts as an air shut-off when the water is almost exhausted, thus automatically stopping the engine and warning the driver that the air washer is in need of refilling. If this is impossible immediately, the engine may be again operated by utilizing the water filler, I, as an emergency air entrance. The upper end of the float tube is further protected by the housing, L, all the air being forced to pass between the edge of this housing and the upper tank at low velocity.

This type of air-cleaning device was adopted as the one presenting the most desirable features, after a very careful review of the possibilities of construction.

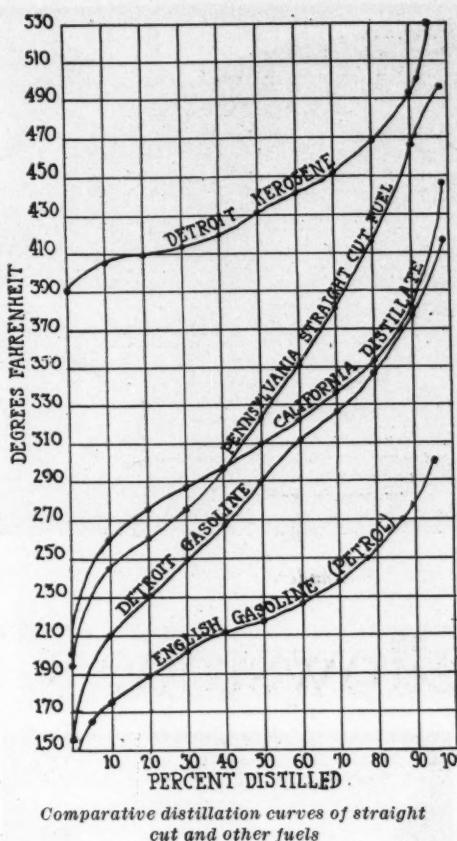
Air purifying apparatus as used in other lines of business has been of two main types—wet and dry. The dry type has been used mainly in such devices as exhaust heads for collecting shavings, saw-dust and similar materials. The wet type is used in conditioning air for public meeting places, and the factories of those concerns, the preparation of whose produce is dependent on maintaining certain fixed conditions of the air as regards absence of dirt, temperature, humidity, etc. Among the many lines of business employing apparatus of this type may be mentioned photographic supply manufacture and tobacco manufacture.

The dry type of air-purifying apparatus for use on trucks and tractors must depend either on centrifugal force, or large areas of fine mesh screen. The results of tests along these lines were discouraging, either because of incomplete cleansing action, or large space required if the supply of air to the carburetor was not to be greatly restricted.

The wet type of air washer was chosen because of the following advantages:

- 1—Practically complete removal of dust or dirt entering with the air.
- 2—Very slight power required for operation, if any.
- 3—Relatively small size.
- 4—Slight increase of power delivered by the motor if using an exhaust heated carbureting device.

The only serious objection to this type of



Comparative distillation curves of straight cut and other fuels

apparatus is the consumption of water in those regions where humidity is low and temperature high. Tests so far have shown water consumption between 1/20 and 1/10 of a pound per horsepower per hour; this was with humidity ranging from 25 per cent to 75 per cent and with air temperature approximately 80 deg. At a temperature of 110 deg., this water consumption would be approximately doubled.

It is impossible to reduce this water consumption by any mechanical means, as tests have shown that no water leaves the washer in the form of drops, but that all the water used is taken up as water of saturation of the air. In no case has the air leaving the air washer been completely saturated.

This type air washer is particularly suitable for use with the Holley vaporizer, or other exhaust heated carburetor, but may be used satisfactorily with ordinary carburetors with practically no change in adjustment. A

recent test by a prominent truck maker showed the same horsepower and fuel consumption with and without the air washer, using the regular gasoline carburetor. It is probably advisable, however, to apply heat between the air washer and the carburetor by utilizing the exhaust, when the air washer is used with an ordinary type of carburetor. The air entering the air washer, however, should be maintained at as low a temperature as possible, to conserve the water.

Holley Vaporizers in Service

That the Holley vaporizer is a practical solution of the utilization of heavy fuels, is shown by the continued reports of satisfactory operation of those now in use in England and France, on Ford tractors and cars. The tractors were shipped abroad several months ago and have been in almost continuous service ever since.

The British Government has made arrangements to manufacture the Ford tractor in Great Britain as a war measure in order to increase the home production of food supplies. All these tractors are to be equipped with the Holley vaporizer, arrangements to manufacture which are now being completed by the English branch of Holley Bros. Co.

In this country and England, the Holley vaporizer is now being marketed for application to Ford cars. This instrument is constructed with two float chambers, for gasoline and heavy fuel respectively. A 2-gal. tank for gasoline is furnished with each outfit, the regular Ford tank being utilized for the heavy fuel.

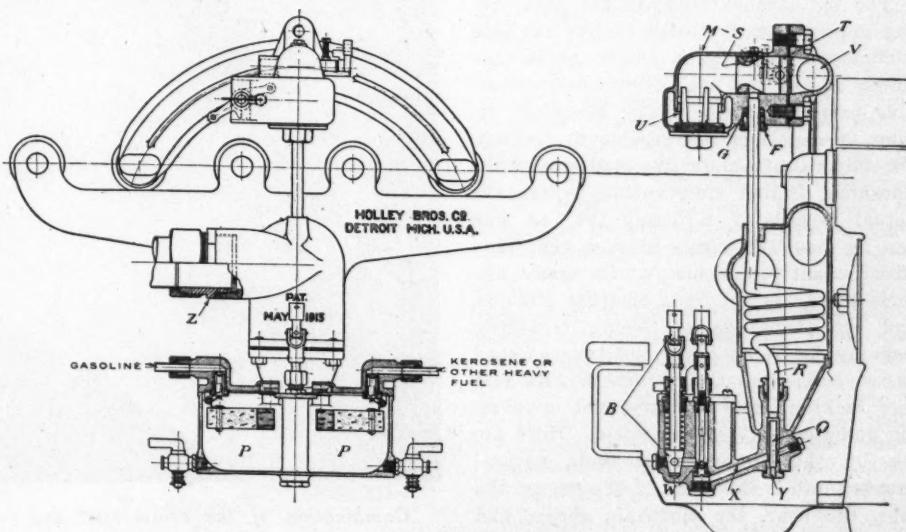
Starting is accomplished on gasoline, as with an ordinary carburetor, and then 1 to 3 min. after starting it is possible to shift from gasoline to the heavy fuel, even during cold winter weather.

Acceleration and maximum speed are practically the same as obtained on gasoline, and no trouble is experienced from smoke, except in cases of failure of the ignition in any one cylinder. If this happens, kerosene will gradually collect, with the result that when ignition again takes place there will be considerable smoke until the accumulation is disposed of.

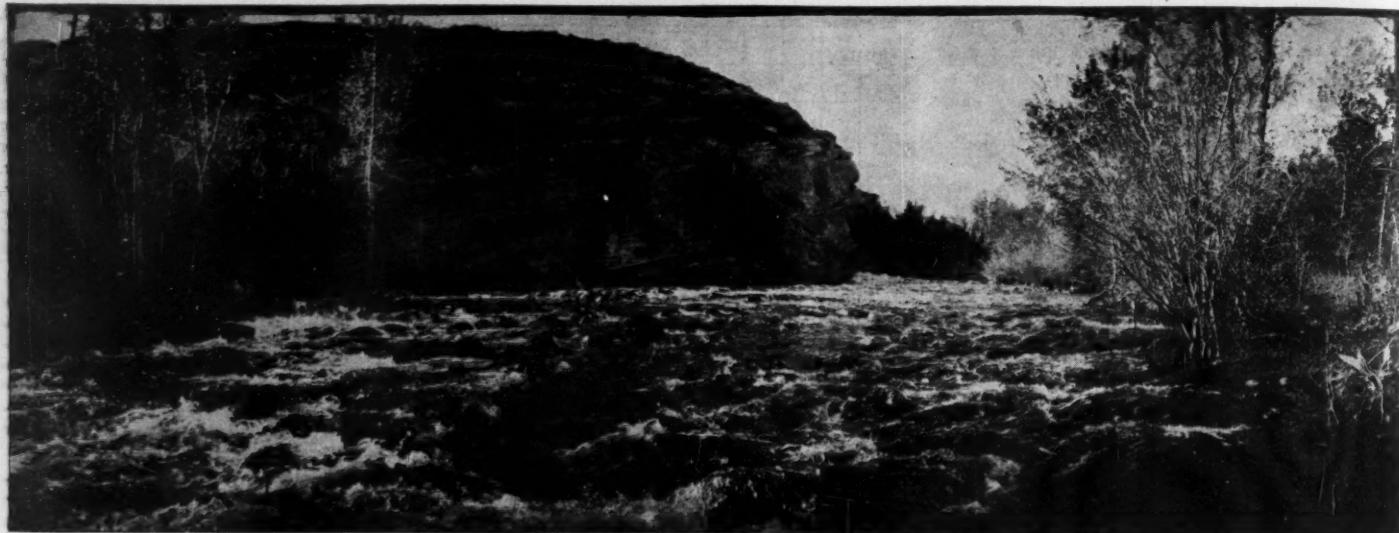
In case of ignition failure, as mentioned previously, some of the kerosene collecting in the cylinder will work past the piston rings and dilute the oil in the crankcase. For this reason it is advisable to watch the quality of the oil carefully; until time is determined during which it is safe to run without renewing the oil.

While the Holley vaporizer has been developed

(Concluded on page 43)



Sectional views of Holley vaporizer now in service on Ford cars and tractors in England



The nimrod's paradise—one of the many places on the Lander-Way-Yellowstone Park road where mountain trout are found in abundance

Opening Yellowstone's Front Door

DEFINITE plans are now under way to open a road to the southern entrance of the Yellowstone National Park from Lander, Wyo., during the coming summer. The movement is in line with the plans of the government officials to make our national parks more accessible and more popular with the traveling public.

Since the opening of the Yellowstone Park to motor cars there has been an insistent demand among motorists to have the Lander road opened for travel. During last season a dozen cars braved the mountain road and went out by the Lander way, despite the fact that no work had been done. For this reason the Lander Commercial Club has undertaken a definite campaign to open up the road for traffic during the coming season. The scheme is being supported financially and morally by a number of strong towns directly interested in central Wyoming.

Previous Access Limited

The southern entrance to the park, owing to poor road facilities, always has been virtually a closed gate. Although it comprises one of the most scenic and attractive portions of the Rocky Mountain region, it has been inaccessible to tourists. Directly out of Lander the road crosses the Shoshone Indian Reservation, where the actual process of civilizing the red man can be seen. It passes through the Wind River country, famous for its many historic spots, its hundreds of trout streams, and its thousands of scenic treasures. Leaving the Wind River country, the road passes across the Continental Divide into the Jackson Hole country, the greatest big game country in the world. Here are elk by the hundreds in their natural haunts; here is the home of the moose, the deer, the bear, the mountain sheep, and all of those animals which inhabit the mountainous country. From the Jackson



Combination of the commercial and the aesthetic—water power and the cascades on the Lander-Way

Hole country the road passes directly into the southern entrance of the park, and traverses the most famous of America's playgrounds.

That vast stretch of mountain and valley which extends in a southerly direction from the Yellowstone Park toward Lander, Wyo., might be very fittingly called "The Front Door Yard" of the park. This expression seems very appropriate, since we commonly think of the front door yard as being the most beautiful spot surrounding a home. It is here that the gardener and the home-builder puts in his best efforts. It is here that the Creator outstripped all his former works in grandeur and beauty.

Predict Yellowstone Annex

Rugged snow-capped peaks; verdant valleys and rocky canyons washed by the clearest of mountain streams and rivers; historical spots which stand as monuments to the early history of the west and the pioneers who blazed the first trails into Wyoming—these and a thousand other attractions are available to the tourist on the Lander road to Yellowstone National Park. It would not be surprising some day to find that the government had designated a large portion of this area as Yellowstone Park Annex.

It has only been in the late years that the tourist business has been commercialized in this section, but during that time it has grown to such proportions that it has become one of the regularly recognized industries. Easy accessibility to the mountains and the big game country from this region has added to its popularity.

Plans are under way at the present time for an expensive permanent road to be built through this country in conjunction with the government. Present developments indicate that this will be one of the first projects to be undertaken by the gov-

ernment under the Federal aid road act. The road which the Lander people have decided to open the coming summer will care for the traffic until the permanent highway is constructed. While the Lander people are not guaranteeing a first-class boulevard road, they are guaranteeing to take care of every tourist who comes their way during the coming season, and will make necessary provisions along the entire route to eradicate any unreasonable inconvenience. Tourists who traveled this road last season report that they were able to get through without any great inconvenience. Present plans call for an expenditure of sufficient money to place the highway in good passable shape.

In connection with the Lander entrance to the Park, a direct route from Denver, to be known as the Denver-Yellowstone highway, is being planned. The road as outlined at the present time will run by the way of Fort Collins, Colo., Laramie, Wyo., Rawlins, and Lander. This route will have the advantage over other roads to Yellowstone Park in that it will be approximately 150 miles shorter than any other highway to the park and in that it will follow closely the Rocky Mountain range, giving the motorist an abundance



Warm Springs Canyon on the Lander road into Yellowstone Park

of fishing, good water, unsurpassed scenery and avoiding roads in the bad lands.

Answers to Inquiries

Philadelphia, Pa.—Baton Rouge, La.

PHILADELPHIA, Pa.—Editor MOTOR AGE
—Give best routing from here to Baton Rouge, La.; also give mileage.—A. T. Prescott.

From Philadelphia, proceed to Darby, Norwood, Marcus Hook, Wilmington, Del., Newark, Elkton, Md., Charlestown, Perryville, Bel Air, Baltimore, Washington, D. C., Alexandria, Accotink, Dumfries, Mountain View, Fredericksburg, Spotsylvania, Coatesville,

Richmond, Va., Manchester, Kenbridge, Clarksville, Stovall, Providence, Durham, Hillsboro, Burlington, Greensboro, Jamestown, Thomasville, Lexington, Salisbury, Concord, Harrisburg, Charlotte, Belmont, Gastonia, Blacksburg, Gaffney, Spartanburg, Greer, Greenville, Grove, Piedmont, Anderson, S. C., Browns Ferry, Hartwell, Ga., Royston, Lees, Athens, Monroe, Snellville, Clarkson, Decatur, Atlanta, Fort McPherson, Fairburn, Palmetto, Moreland, Hogansville, Lagrange, Lanett, Langdale, Opelika, Auburn, Notasulga, Tuskegee, Montgomery, Burkville, Lowndesboro, Benton, Selma, Beloit, Orrville, Safford, Uniontown, Demopolis, Moscow Ferry, Coatopa, York, Cuba, Ala., Meridian, Miss., Quitman, Heidelberg, Errata, Laurel, Ellisville, Hattiesburg, Clyde, Columbia, Sandy Hook Sta., Bogalusa, La., Mandeville, New Orleans, Kenner, St. Charles, Reserve, Lutcher, Welham, Convent, Central, Burnside, Geismar, Prairieville, to Baton Rouge.

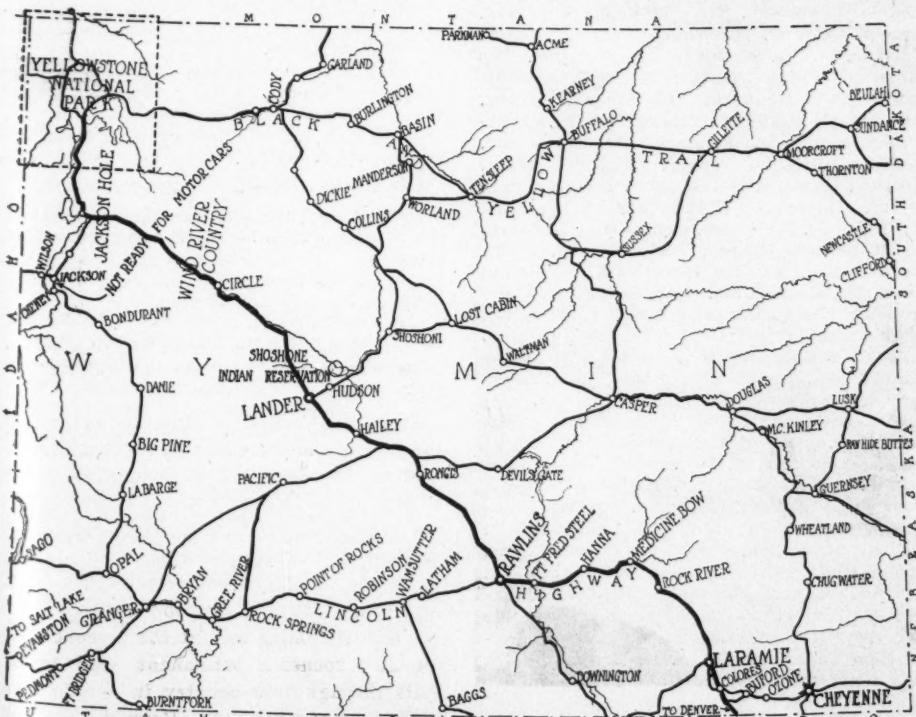
This trip embraces 1625 miles.

Vol. 6 of the Automobile Blue Book published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for the above.

Pierre, S. D.—Chattanooga, Tenn.—Abbyville, Ga.

HAYES, S. D.—Editor MOTOR AGE—Give route from Pierre, S. D., to Ebbyville, Ga., via Pana, Ill., and Chattanooga, Tenn. Also state mileage.—E. E. Neil.

From Pierre, S. D., proceed to Blunt, Harrold, Highmore, Ree Heights, Miller, St. Lawrence, Wessington, Huron, Iroquois, Manchester, Desmet, Lake Preston, Arlington, Volga, Brookings, Dell Rapids, Sioux Falls, Canton, Beloit, Fairview, Hudson, Hawarden, Akron, Westfield, Sioux City, Salix, Sloan, Whiting, Onawa, River Sioux, Missouri Valley, Omaha, Council Bluffs, Glenwood, Randolph, Shenandoah, Tarkio, Burlington Junction, Wilcox, Maryville, Bolckow, Rosedale, Wyeth, Savannah, St. Joseph, Cameron, Hamilton, Breckenridge, Utica, Chillicothe, Laclede, Brookfield, St. Catherine, Bucklin, Macon, Clarence, Lentner, Shelbina, Lakenan, Hunnewell, Monroe, Oakwood, Hannibal, Kinderhook, Barry, Hadley, Baylis, New Salem, Maysville, Griggsville, Valley City, Bluff, Jacksonville, Berlin, Springfield, Taylorville, Assumption, Pana. Then go to Ocone, Ramsey, Vera, Vandalia, Bluff City, Augsburg, Salem, Dix, Mount Vernon, Bonnie, Ina, Benton, Frankfort Heights, Johnston City, Marion, Willeford, Creal Springs, New Burnside, Ozark, Ganttown, Samoth, New Columbia, Round Knob, Metropolis, Maxon Mill, Paducah, Briensburg, Eggner's ferry across Tennessee river, Golden Pond, ferry across Cumberland river, Cadiz, Hopkinsville, Clarksville, Adams, Cedar Hill, Springfield, Nash-



Map of major Wyoming roads with the Lander-Way to the south entrance to Yellowstone Park shown in heavy line

ville, LaVergne, Murfreesboro, Beechgrove, Noah, Manchester, Hillsboro, Pelham, Wonder Cave, Monteagle, Tracy City, Sequatchie, Jasper, Rankin's ferry across Tennessee river, Wauhatchie, Chattanooga, Rossville, Boynton, Ringgold, Dalton, Resaca, Calhoun, Adairsville, Cassville, Cartersville, Allatoona, Acworth, Kennesaw, Marietta, Smyrna, Atlanta, Mountain View Station, Jonesboro, Lovejoy, Hampton, Pomona, Griffin, Milner, Barnesville, Forsyth, Lorane Station, Macon, Echeconnee Station, Perry, Hawkinsville, Big Creek to Abbeville.

This trip approximates 2000 miles. Vols. 7, 5 and 6 of the Automobile Blue Books, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contain complete running directions.

Chicago—Zanesville, Ohio

Hamilton, Ohio—Editor Motor AGE—Give me the best routing from Chicago to Zanesville, Ohio, and also from Cincinnati to Zanesville. Where can I secure a guide book?—O. M. Gross.

For the first route proceed from Chicago to South Chicago, Hessville, Highland, South Gary, Hobart, Wheeler, Valparaiso, Westville, Laporte, South Bend, Ligonier, Merriam, Churubusco, Fort Wayne, New Haven, Van Wert, Delphos, Lima, Kenton, Meeker, Marion, Delaware, Columbus, Granville, Newark, Jacksontown, Linnville to Zanesville.

From Cincinnati go through Norwood, Pleasant Ridge, Montgomery, Twenty-Mile Stand, Fosters, Morrow, Clarksville, Sligo, Wilmington, Sabina, Washington Court House, Circleville, Amanda, Lancaster, Sego, White Cottage to Zanesville.

Vol. 4 of the Automobile Blue Books, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contains complete running directions for the above trips. Price \$3.

Great Falls, Mont.—Kansas City, Mo.

Belt, Mont.—Editor Motor AGE—Give a route from Great Falls to Kansas City, Mo.—Sam J. Wright.

From Great Falls the route lies through Belt, Irmington, Stanford, Windham, Benchlands, Moccasin, Hobson, Lewistown, Forest Grove, Tyler, Roundup, Thirty Mile, Billings, Warren, Cowley, Lovell, Greybull, Basin, Manderson, Worland, Neiber, Chatham, Kirby, Thermopolis, Reids Ranch, Lost Cabin, Arminto, Waltman—enquire here as to best road for Casper—Casper, Glenrock, Douglas, Orin Junction, McKinley, Glendo, Badger, Uva, Wheatland, Chugwater, Cheyenne, Egbert, Bushnell, Kimball, Potter, Sidney, Sunol, Lodgepole, Chappell, Big-spring, Brule, Ogallala, Paxton, Sutherland, North Platte, Gothenburg, Willow Island, Cozad, Lexington, Overton, Elm Creek, Odessa, Kearney, Shelton, Wood River, Grand Island, Chapman, Central City, Clarks, Silver Creek, Duncan, Columbus, Richland, Schuyler, North Bend, Ames, Fremont, Valley City, Waterloo, Elkhorn, Omaha, Council Bluffs, Glenwood, Randolph, Shenandoah, Tarkio, Burlington Junction, Wilcox, Maryville, Savannah, St. Joseph, Halleck, Dearborn, Edgerton, Trimble, Smithville, Gashland to Kansas City.

Vol. 7 of the Automobile Blue Books, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contains complete running directions for this trip.

Duluth, Minn.—Binghamton, N. Y.

Duluth, Minn.—Editor Motor AGE—Give a route from here to Binghamton, N. Y., passing through Jamestown, N. Y. Also a route from here to Cameron, Mo.—C. O. Applehagen.

From Duluth proceed to Superior, Itasca, Hawthorne, Lake Nebagamon, Barnes, Drummond, Grandview, Bibon, Ashland, Marengo, High Bridge, Mellen, Cayuga, Morse, Glidden, Butternut, Park Falls, Fifield,

Phillips, Ogema, Westboro, Chelsea, Medford, Wausau, Bowler, Tilleda, Thornton, Shawano, Green Bay, Denmark, Kellner's Corners, Manitowoc, Erdman's Corners, Sheboygan, Port Washington, Lakefield Corners, Milwaukee, Cudahy, South Milwaukee, Racine, Kenosha, Winthrop Harbor, Zion City, Waukegan, North Chicago, Highland Park, Kenilworth, Evanston, Chicago, South Chicago, Hessville, Highland, South Gary, Hobart, Wheeler, Valparaiso, Westville, La porte, South Bend, Mishawaka, Elkhart, Goshen, Benton, Ligonier, Wawaka, Brimfield, Kendallville, Butler, Edgerton, Bryan, Archbold, Wauseon, Toledo, Lemoyne, Woodville, Fremont, Clyde, Bellevue, Monroeville, Norwalk, Townsend, Wakeman, Oberlin, Elyria, Morley's Corners, Cleveland, University Circle, Willoughby, Painesville, Unionville, Geneva, Ashtabula, Conneaut, Girard, Erie, Harbour Creek, Moorheadville, North East, Pa., Ripley, Forsyth, Westfield, Mayville, Hartford, Dewittville, Bemus Point to Jamestown.

Vols. 5, 4 and 1 of the Automobile Blue Books contain complete running directions for this trip.

From Duluth drive to Carlton, Atkinson, Barnum, Moose Lake, Rutledge, Sandstone, Hinkley, Pine City, Rush City, White Bear Station, St. Paul, Rosemont, Farmington, Northfield, Dundas, Faribault, Medford, Owatonna, Geneva, Albert Lea, Glenville, Northwood, Kentsett, Mason City, Hampton, Iowa Falls, Hubbard, Nevada, Cambridge, Des Moines, Indianola, Medora, Liberty, Osceola, Leon, Davis City, Lamoni, Eagleville, Bethany, Bridgeport, Pattonsburg, Winston to Cameron.

Vol. 5 of the Automobile Blue Books, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, contain complete running directions of this trip.

Oklahoma City, Okla.—Seattle, Wash.

Ada, Okla.—Editor Motor AGE—Outline a trip from Oklahoma City to Seattle, Wash., from there to Eureka, Cal., San Francisco, Los Angeles, back to Oklahoma City via the Grand Canyon.—Wm. C. Whitaker.

For the first part of the trip proceed to Packingtown, Yukon, El Reno, Calumet, Geary, Bridgeport, Hydro, Weatherford, Clinton, Foss, Elk City, Sayre, Delhi, Erick, Texola, Shamrock, Tex., McLean, Allanreed, Groom, Conway, Amarillo, Dalhart, Texline, Clayton, N. M., Mount Dora, Grenville, Des Moines, Dedman, Raton, Trinidad, Aguilar, Rugby, Walsenburg, Greenhorn, Crow, Pueblo, Fountain, Colorado Springs, Pikeview, Monument, Palmer Lake, Greenland, Sedalia, Littleton, Denver, Brighton, Evans, Greeley, Lucerne, Eaton, Ault, Pierce, Nunn, Dover, Cheyenne, Chugwater, Wheatland, Uva, Glendo, McKinley, Orin Junction, Douglas, Glenrock, Casper, Stone Ranch, Johnson's Ranch, Powder River ford, Waltman, Arminto, Lost Cabin, Reid's Ranch, Thermopolis, Kirby, Chatham, Neiber, Worland, Manderson, Basin, Greybull, Lovell, Cowley, Warren, Billings, Laurel, Park City, Columbus, Merrill, Reed Point, Big Timber, Hunter's Hot Springs, Livingston, Bosman, Belgrade, Manhattan, Old Three Forks, Cardwell, Whitehall, Butte, Anaconda, Phillipsburg, Maxville, Hall, Drummond, Bearmouth, Bonita, Clinton, Missoula, Hudson, Alberton, Superior, St. Regis, Deborgia, Saltese, Summit of Bitter Root divide, Mullan, Wallace, Kellogg, Kingston, Cataldo, Coeur d'Alene, Spokane, Deepcreek, Reardan, Davensport, Creston, Wilbur, Almira, Coulee City, Spencer, Waterville, Orondo, Wenatchee, Vantage Ferry, Ellensburg, Cle Elum, Easton, Snoqualmie Pass, Northbend, Snoqualmie Falls, Fall City, Campton, Redmond, Kirkland to Seattle.

Seattle, Wash.—Eureka, Cal.

From Seattle proceed to Georgetown, Duwamish, Riverton, Orilla, Sumner, Ardena, Tacoma Junction, Tacoma, Lakewood, Olympia, Tumwater, South Union, Grand Mound, Centralia, Chehalis, Cowlitz, Toledo, Castle Rock, Kelso, Carrolton, Kalama, Martin's Bluff, Woodland, Woodland ferry across Lewis river, Sarah, Felida, Vancouver, Portland, Ore., Oregon City, Salem, Liberty, Jefferson, Albany, Corvallis, Monroe, Junction City, Eugene, Goshen, Walker, Cottage Grove, Draf, Yoncal, Oakland, Sutherlin, Edenbauer, Roseburg, Myrtle Creek, Riddle, Canyonville, Summit, Wolf Creek, Grant's Pass, Selma, Kerby, Waldo, Monumental, Gasquet, Adams, Crescent City, Requa, Klamath River ferry, Alliance Corner, Arata, Bayside to Eureka.

Eureka, Cal.—San Francisco—Los Angeles, Cal.

From Eureka drive to Elk River Corner, Field's Landing, Beatrice Station, Loleta, Fortuna, Alton, Rio Del, Pepperwood, Dyer-ville, Fruitland, Harris, Cummings, Layton-ville, Willits, Calpella, Ukih, Hopland, McCrays, Cloverdale, Geyserville, Healdsburg, Windsor, Santa Rosa, Denman Station, Petaluma, Ignacio, San Raphael, Sausalito, San Francisco, Niles, Centerville, Irvington, Milpitas, San Jose, Morgan Hill, Gilroy, San Juan, Calinas, Gonzales, Greenfield, King City, San Ardo, Bradley, Paso Robles, San Luis Obispo, Arroy Grande, Nipomo, Santa Maria, Los Alamos, Los Olivos, Santa Ynez, Santa Barbara, Summerland, Carpinteria, Ventura, Montalvo, El Rio, Camarillo, Calabasas, Hollywood to Los Angeles.

Los Angeles—Oklahoma City

From Los Angeles drive to Bairdstown, South Pasadena, Lamanda Park, Monrovia, Azusa, Glendora, Cucamonga, Etiwanda, Rialto, San Bernardino, Victorville, Barstow, Daggett, Ludlow, Danby, Needles, Yucca, Kingman, Hackberry, Peach Springs Station, Pico Station, Seligman, Ash Fork, Grand Canyon, Grandview, Flagstaff, Winslow, Holbrook, Adamana, Navajo, Houck, Manuelito, Defiance, Gallup, Grants, Paraje, Los Lunas, Peralta, Isleta, Armijo, Albuquerque, Moriarty, Estancia, Encino, Santa Rosa, Puerto de Luna, House, Clovis, Texico, Hereford, Umbarger, Canyon, Amarillo, Conway, Grööm, Allanreed, McLean, Shamrock, Texola, Erick, Delhi, Sayre, Elk City, Foss, Clinton, Weatherford, Hydro, Bridgeport, Geary, Calumet, El Reno, Yukon, Packington to Oklahoma City.

Vols. 7 and 8 of the Automobile Blue Books, published by the Automobile Blue Book Pub. Co., 910 South Michigan avenue, Chicago, contain complete running directions for the above trips.

Little Rock, Ark.—Los Angeles, Cal.

Little Rock, Ark.—Editor Motor AGE—Advise best route from here to Los Angeles.—W. G. Prosser.

From Little Rock proceed to Benton, Lonesdale, Hot Springs, Arkadelphia, Gurdon, Bough-ton, Prescott, Emmet, Hope, Fulton, Texarkana, New Boston, DeKalb, Oak Grove, Annona, Clarksville, Detroit, Blossom, Paris, Brookston, Petty, Honey Grove, Windom, Bonham, White-wright, Vandalia, Anna, Melissa, McKinney, Dallas, Grand Prairie, Dalworth, Arlington, Handley, Fort Worth, North Fort Worth, Rhone, Decatur, Alvord, Sunset, Bowie, Bellevue, Henrietta, Wichita Falls, Iowa Park, Electra, Olaunion, Vernon, Chillicothe, Quanah, Childress, Estelline, Newline, Memphis, Jiles, Clarendon, Goodnight, Amarillo, San Jon, Tucumcari, Cervo, Santa Rosa, Encino, Albuquerque, Armijo, Isleta, Peralta, Los Lunas, Paraje, Grants, Thoreau, Gallup, Defiance Station, Manuelito Station, Houck Station, Navajo, Adamana, Holbrook, Winslow, Flagstaff, Williams, Ashfork, Seligman, Hackberry, Kingman, Tucca, Topock, Needles, Ludlow, Barstow, Oro Grande, Victorville, San Bernardino, Rialto, Etiwanda, Cucamonga, Lordsburg, San Dimas, Vineland, Montebello to Los Angeles.

Aircraft and Motor Car Engine Design

Views from the Standpoint of a Designer and Manufacturer of Both Types

PERHAPS more than to any other one individual, England is indebted to Louis Coatalen for its supremacy in airplane engine design and consequently its measure of supremacy in the air over the western front in Europe. Mr. Coatalen designed the twelve-cylinder Sunbeams which have been campaigned on the speedways in this country and in Europe and has been responsible for many of the leading English developments and the putting of English motor mechanics on a higher plane of efficiency. The following excerpts on a paper presented by him to the Aeronautical Society of Great Britain at the Society of Arts in London are timely:

Mr. Coatalen opened by saying that the British national habit of decrying their own achievements and praising that of foreigners, notably the Germans, was never more in evidence than in the case of the aircraft engine problem; nor was it ever less justified. The case of the latest six-cylinder Mercedes engine to be captured by the allies might be taken by way of illustration. Without water and radiator it weighed 3½ lbs. per horsepower; whereas the latest British water-cooled aircraft engine in the same condition weighed 1 lb. less per horsepower. As regards efficiency, he claimed that England had produced engines that were out and away superior to anything employed in the campaign to date. He pointed out that the belief which appears to obtain in some quarters to the effect that the design and production of an aircraft engine is akin to that of a motor car one is erroneous. Flexibility, silence and cost of production are governing factors in designing a motor car engine; they are practically of no consequence in the case of an aircraft one. On the other hand, weight, a very high brake mean effective pressure, the capability to work at full power for long periods and comparatively great horsepower output—reckoned in terms of hundreds instead of tens—are of prime importance in aircraft engine construction and of comparative unimportance in motor car engine design and production. On this and sundry other grounds, the lecturer detailed, the design of the two types must start from fundamentally opposite points of view.

Value of Racing Experience

"We must not lose sight of the likelihood that the rapid evolution of the aircraft engine during this war and the extraordinarily wide manufacturing experience, which is the outcome of that, will at some future time exercise more than a temporary effect on the design and manufacture of engines for car service," he said. He held that there was a closer analogy between the motor car engine designed and built specially for racing before the war and the wartime aircraft engine than there was between either that type of car engine and the standardized car engine, or, again, the standardized car engine and the aircraft engine of today. For instance, the racing car engine resembles the latest aviation types in that a very high mean effective pressure has to be obtained with it. As the problem in both cases is power for weight and engine volume, and not silence and low cost, great freedom is allowed the designer of a

racing car engine as regards piston clearances, valve timing, compression, largeness of valve area, strength of valve springs and so forth, the particulars in this connection approximating much more to aviation than to standard car practice.

The chief desideratum in designing aircraft engines is light weight combined with low fuel and oil consumption per horsepower; also with reliability. Minor desiderata, which already have been largely realized, embrace simplification to the utmost in face of aircraft engines being placed, for the most part, in the hands of semi-skilled talent, whether as regards actually using or merely maintaining them. Hence the demand for that quality which is generally called "fool-proof"; for accessibility, particularly in face of the fortunes of war rendering it necessary on occasions to replace the most vital parts; and suitability of exterior form that the powerplant may be accommodated conveniently in the aircraft and occasion the minimum displacement.

For the first time in the story of motor engineering we are making aircraft engines of high output in series instead of some half a dozen examples at a time.

There are strict limits to the sizes which are practicable for radial engines, whether of the rotary or stationary types. In regard to either vertical or V-type engines, the nature of the particular service to which each individual machine is to be put likewise imposes certain limits on design. Sometimes this may concern the overall length of the engine, particularly when in waging war in the air it is essential to lose the minimum time in altering the attitude of the machine from a diving position to a very steep climbing one. Again, some series of aircraft call for the minimum head resistance but are less imperative as to overall length. Hence six-cylinder types would be suitable for such service, whereas V-shaped varieties might not be.

Hard and Fast Rules Impossible

At this period it is impossible to lay down any arbitrary rules as to any one type of aircraft engine being suitable for the needs of all aircraft service. Those needs are almost as various as are the demands for special varieties of steel and alloys. Moreover, they are likely to multiply with the lapse of time. Aircraft engine design resembles motor car engine production in this particular, that it is all the time a question of compromise. The most successful designer is he who exercises the soundest judgment in weighing a hundred and one factors of the hour and who makes the shrewdest estimate of the value of each.

Continuing, Mr. Coatalen said that in the circumstance of being in mid campaign it was not possible to state definitely the size of aircraft engine which most likely would be adopted as standard in the near future. Experience gained by our aviators at the beginning of the war, together with the demands for the engineer to meet their ever-growing needs, have called for continuous evolution in the design of aircraft, which has inspired corresponding enterprise in regard to engine construction and production.

For short flights the rotary type of engine generally and the air-cooled varieties have shown up to advantage to date, though with them the consumption of fuel and lubricating

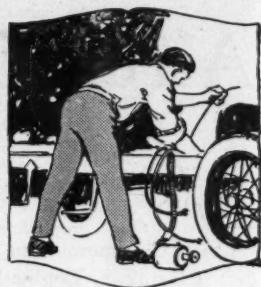
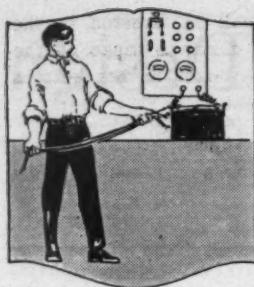
oil may be comparatively high; this is offset by the relative lightness of their starting weight. But for longer flights, in connection with which petrol and oil consumption have to be reckoned with as part of the engine weight, water-cooled stationary type engines have proved most suitable.

Speaking broadly, as regards weight per horsepower, progress in the design of the ordinary water-cooled type of aircraft engine has been very marked. In the brief period of two years Sunbeam-Coatalen aircraft engines of this type have been reduced in weight from 4.3 lbs. per horsepower to 2.6 lbs. per horsepower. The design of the engine head, cylinders, the valves and the valve gear is one of the cardinal features of successful aircraft engine production. For water-cooled aircraft engines Mr. Coatalen favors two overhead exhaust and two overhead inlet valves per cylinder, a conclusion which would appear to be justified by the horsepower obtained from engines designed and standardized on this principle. Incidentally, it allows of the best sparking plug position—namely, in the center of the cylinder head in the vertical position. Three valves per cylinder—namely, one inlet and two exhaust valves—have been found practicable for certain varieties of work. He holds that more than four valves per cylinder is an undesirable scheme, as it seems hardly possible to place them so as to leave an even jacket all round each valve without the employment of very complicated gear. We have an example of this in the Maybach (German) aircraft engine, which has three exhaust and two inlet valves per cylinder. In this little water space is provided between the valve seats, while the sparking plug is, besides, set horizontally on the side of the cylinder barrel.

Not only has there been much improvement in cast iron available for cylinders; aluminum alloys employed with knowledge and skill for that purpose have been found, besides, of great advantage, of course, reducing weight per horsepower to an extraordinary extent. Though we are merely on the threshold of realizing the possibilities of aluminum alloys for cylinder castings, it cannot be doubted that within a very brief period they will be recognized as the standard materials for this work, cast iron thenceforward being discarded in favor of them. For two years Mr. Coatalen has standardized aluminum alloy pistons with excellent results.

Air-Cooling Is Favored

It is to note, further, that air-cooling is coming into favor increasingly. The introduction of aluminum alloy in the manufacture of the cylinders has exercised a marked effect in regard to this tendency. In the near future air-cooled engines of greater power may be expected to materialize. Tests on Sunbeam-Coatalen aircraft engines have shown the petrol consumption of .52 pints per horsepower per hour and the oil consumption of .022 pints per horsepower per hour, representing a distinct advantage in consumption by engines using ordinary type carburetors so recently as at the beginning of the war. Nevertheless, there is room for a deal of improvement yet. Whereas at the beginning of the war the maximum mean effective pressure was 106.135 lbs., today it has been increased to 134 lbs. per square inch measured from the brake horsepower and, in some cases, actually through the reduction gear.



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.

Editor's Note— Herewith is presented the forty-seventh installment of a weekly series of articles begun in MOTOR AGE issue of June 29 designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently.

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained.

Part XLVII—Reflectors and Dimming Devices

IN brief the object of a reflector is to provide a means of collecting the rays of light that emanate from the source of light in certain directions and re-direct them in such a manner that the light given out by the source of light is confined to a comparatively small part of the space surrounding the space of light. The earlier forms of reflectors were in the majority of cases of such a shape that they did not intercept a very large portion of the light rays from the source of light and for this reason were quite inefficient. The construction of what is called the lens-mirror type of reflector is shown in Fig. 268. This shows a lamp which originally was constructed to use a gas burner but is now provided with a special electric light attachment which may be moved in or out of position as conditions may demand. In this particular case only the rays of light in a small zone back of the bulb are intercepted by the reflector and re-directed toward the front of the lamp. The reflectors shown in Fig. 269 are of what is called the parabolic type. The advantage of this type of reflector is that it intercepts a very large proportion of the rays of light and for this reason is much more efficient than the lens-mirror type.

The proper device of a reflector for a certain lamp depends almost entirely upon the use that is to be made of the lamp. Thus

in side and tail lamps for example a much less efficient type of reflector may be used than in head and spot lights.

Care of Lamp Reflectors

When the lamp reflectors become dirty or tarnished they may be cleaned and brightened, although the surface of the reflector will be somewhat damaged every time it is touched, no matter how carefully the work is done. Ordinary dust and small particles of foreign matter may be removed by blowing it off, and if it does not yield to this treatment, a stream of clean cold water at a very low pressure may be directed against the surface of the reflector. When water is used the reflector should be allowed to dry and then wiped off carefully with a very soft piece of chamois skin. Alcohol may be and if obtainable should always be used in cleaning the silvered surface of a reflector. The alcohol may be applied by means of a piece of clean soft chamois skin which has been moistened, the reflector being wiped over with a rotary motion starting at the bulb opening and gradually working out toward the outer edge of the reflector as shown in Fig. 270. The chamois skin should be held against the reflector with a light, even pressure.

After the reflector is tarnished quite a bit it may be polished by moistening the chamois with alcohol and then applying a small quantity of jeweler's rouge. After the tarnished surface has

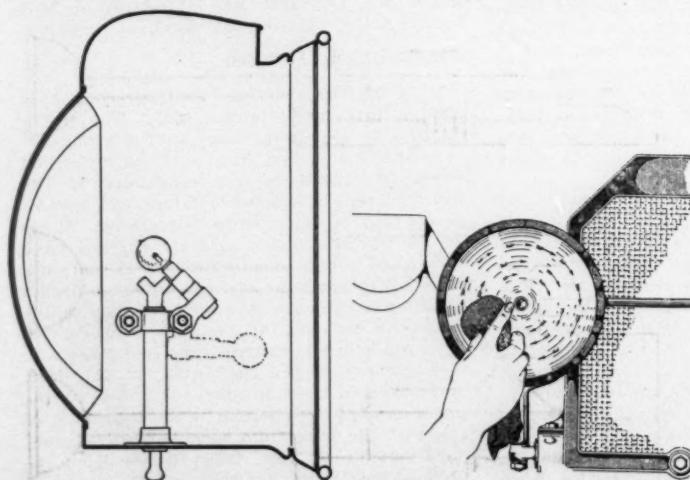


Fig. 268—Lens-mirror type of reflector

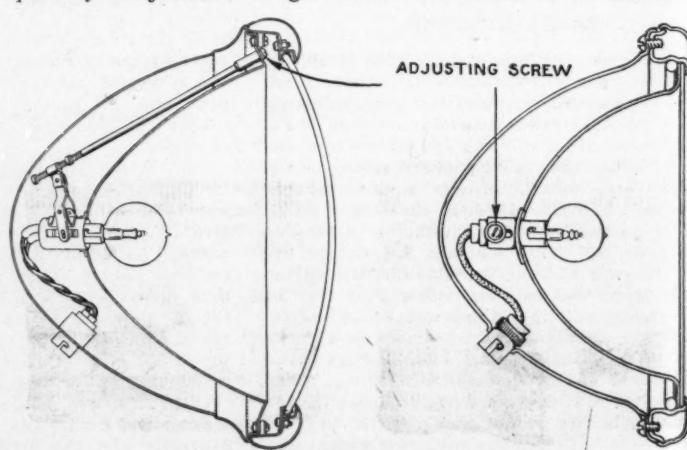


Fig. 269—Reflectors of the parabolic type. This type is more efficient than the lens-mirror type

Fig. 270—Method of cleaning old reflector

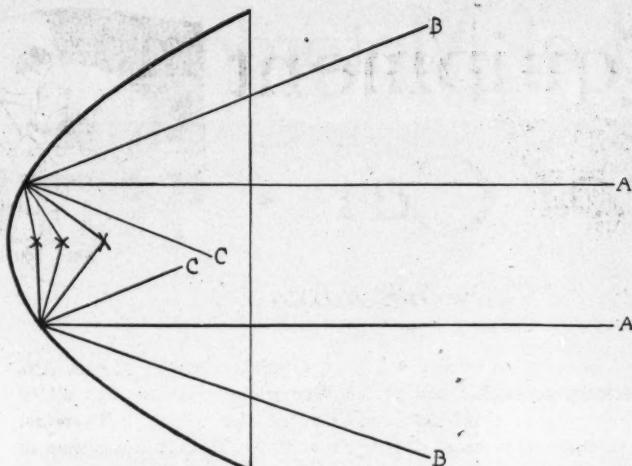


Fig. 271—Direction of light rays for different positions of the lamp in a parabolic reflector

been brightened, the polish may be put on by using a small quantity of the same kind of rouge on a piece of dry chamois skin. The rotary motion should be used in this case just as previously described.

Focusing Lamps

It is necessary that a lamp be in focus in order that the best results may be obtained from the lamp. There is a certain position in a parabolic reflector which corresponds to the focus point, and if a concentrated filament incandescent lamp be mounted in the lamp in such a manner that the source of light in the filament corresponds in position with the focus point of the reflector then the light thrown ahead of the lamp will be along the lines A, A, in Fig. 271. If the lamp is too far back in the reflector the light rays follow the lines B, B, and if the lamp is too far ahead in the reflector the light rays follow the lines C, C. In addition to the lamps being in proper focus their adjustment on the supporting brackets must be such that the light is thrown at the proper point on the road ahead.

The bulbs may be adjusted by moving them back and forth in the reflector until the filament is in the proper relation to the curved surface of the reflector. Quite a number of lamps are made so that the bulb position may be changed by turning a small screwhead or nut mounted in the front or back of the lamp housing and exposed so that it is reasonably accessible. Two different types of adjustment are shown in Fig. 269.

In focusing the headlights one lamp should be adjusted at a time. The bulb of one lamp should be removed or the lamp covered up in order that the light from it will not interfere with the adjustment of the other one. The focusing, of course, should be done in a rather dark location in order that the best results may be obtained. When the adjustment is made on a road the lamp bulb should be moved back and forth until the light on the road is clean and as free from black spots as possible. If the lamp bulb is adjusted in a garage the light should be directed against a wall and the bulb moved until a clean and clear spot of light appears on the wall.

After the lamps have been focused they should be moved on

their brackets so that the spot of light will be directed to the proper point on the road and the desired distance ahead of the car. In some cases it may be necessary to bend the brackets in order to make the last mentioned adjustment.

Wiring and Light Switches

There are three general methods of wiring and connecting the lamps on a car, as follows:

Single-wire system.

Two-wire system.

Three-wire system.

These three different systems of wiring have been described in one of the previous chapters.

The switches used in controlling the light very often are quite complicated in appearance and construction in order that the desired results may be accomplished. A front and rear view of a typical lighting switch is shown in Fig. 272. There are four different positions for the switch as shown in the front view.

Dimming Headlights

One of the simplest devices used in dimming the headlights consists of nothing more than a resistance which may be connected in series with the lamps by means of a switch, mounted in easy reach of the driver. This arrangement reduces the voltage over the lamps which causes them to burn at a much lower candlepower than their rated value. The connections of a dimmer of this type are shown diagrammatically in Fig. 273. When the switch is on the point marked O the circuit is open; when it is on the point B the lamps burn at full voltage; and when it is on the point L the lamps burn at a voltage lower than their rated value.

In some cases the lamps and switch are so connected that the lamps may be connected in series for a dim light and in parallel for full candlepower. A diagram of a system of this kind is shown in Fig. 274.

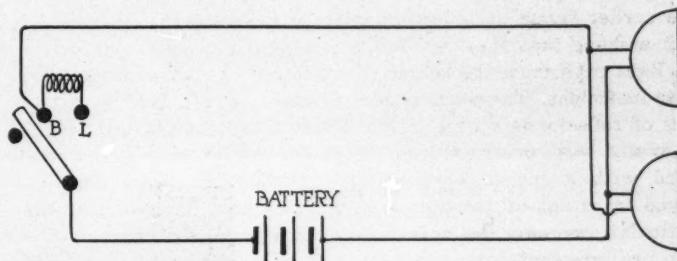


Fig. 273—Resistance connected in a series with lamps to dim headlights

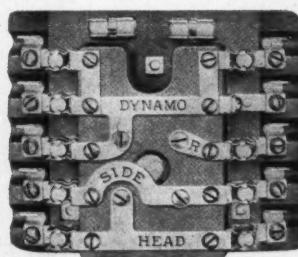
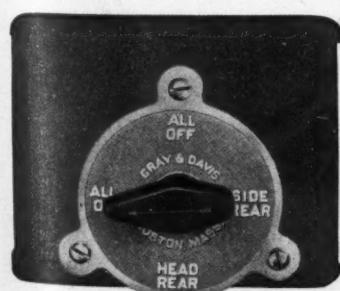
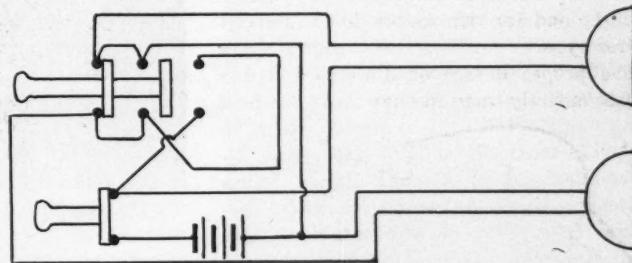


Fig. 272—Gray & Davis junction switch for controlling the lights in a single-wire, or grounded, system

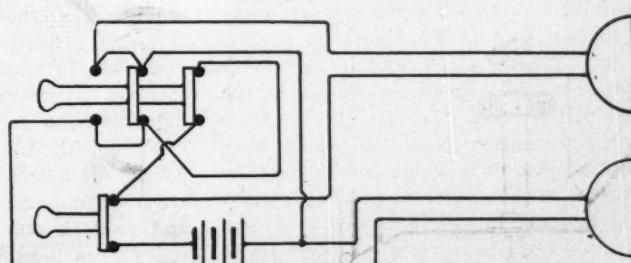
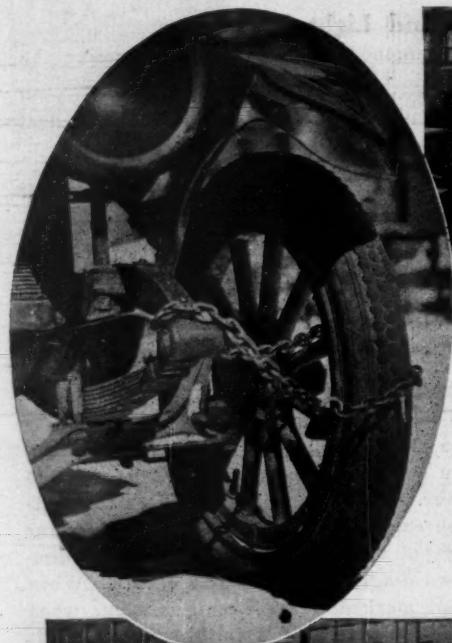


Fig. 274—Lamps connected in series, above, for a dim light and in parallel, below, for full candlepower

The Dog Pound of Motordom



A view of the pound when business was slack. One of the "dog catchers" took advantage of the time to change a weak tire

A captive with its muzzle; in this case it is a chain linking wheel and spring

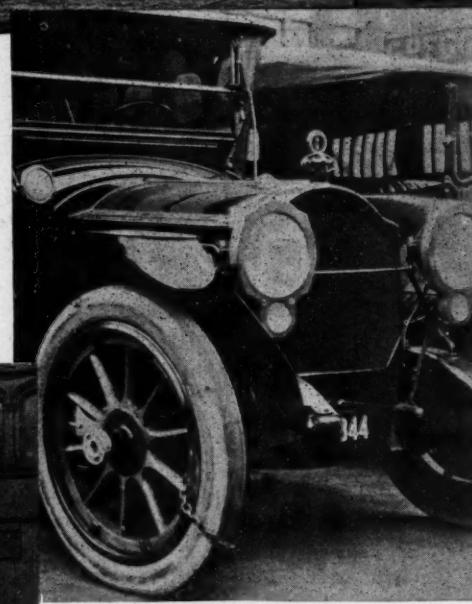


A busy day in the pound. Frequently the truck officers find themselves crowded for space

REMEMBER when they lassoed your pet pup and dragged him off to the dog pound, where you were forced to pay a fee for a license and his freedom? Detroit motorists are recalling that pound when they leave their offices or stores and discover that their cars have been lassoed and towed to the vehicle pound, where \$3 payments must be made to free them.

Commissioner of Detroit Police James Couzens revived the pound scheme to discipline those drivers who let their cars stand more than an hour in the restricted downtown districts.

Policemen walking beats are provided with blue chalk, with which they mark the time of day on the front tire nearest the curb, placing the figures in the center of the tread so that one revolution of the wheel will erase it. As they check up the time and discover those who stand more than the prescribed hour, they report by telephone to the vehicle pound, where two huge police trucks equipped with two policemen and a heavy tow rope each stand ready to go after the offenders and tow them in. They seldom stand long. Busi-



A distinguished victim—Ex-Commissioner of Police John Gillispie's new twin six. The ex-commissioner claimed he ran out of gasoline



Office of the pound—and the treasury, where you pay \$3 for the car's freedom

ness has been exceptionally prosperous, and each day witnesses a constant rush of car owners to the pound to reclaim their machines. The trucks tow an average of six cars each to the pound every working hour, and a day's haul amounts to an average total of 100 motor cars, which means \$300 paid into the vehicle-pound treasury.

As quickly as the car arrives at the pound, the policeman steering the offender steps out and muzzles it with a heavy chain and padlock that is removed only after the \$3 has been paid. Many and varied are the excuses offered by drivers in the vain hope of escaping the payment. Some

claim that they were out of gasoline, others that they had a flat tire, while the women, after voluble protests, usually end by saying, "Goodness, how the time flies." None are successful in their efforts. The only possible relief is to file a protest, which may later effect a refund.

The pound is a roped inclosure, located in Cadillac square, in the heart of the business section, and its office occupies an old shack formerly utilized as a voting station. Commissioner Couzens states that the pound will continue in operation as long as motorists fail to follow the traffic laws.

THE OWNER'S GARAGE

A black and white collage of various garage designs and a car. At the top, there are three separate garage structures: a simple gabled roof, a larger arched entrance, and a half-timbered Tudor-style garage. Below these is a large, circular inset showing a garage with a stone archway and a tiled roof. To the left of this inset is a small, simple garage with a single door. To the right is a garage with a flag flying from the roof. The bottom half of the collage features a large, dark, circular shape, possibly representing a car, with a small, simple garage visible at the bottom left.

REALIZING that included in the 3,000,000 odd motor cars being driven in the United States there are many thousands that are improperly housed, MOTOR AGE has deemed it advisable to devote a department to The Owner's Garage.

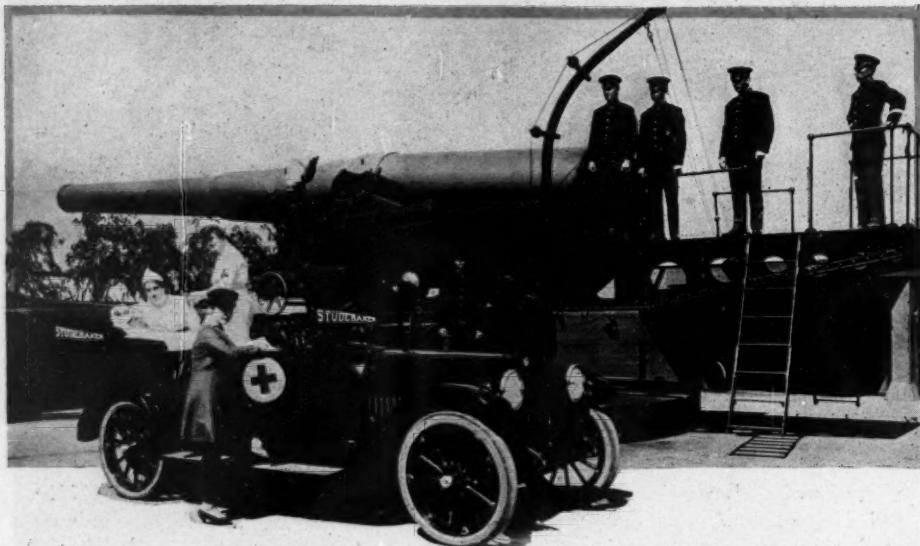
In this department the private garage will be hauled over the coals, raked fore and aft and generally picked to pieces, both from an architectural and a utilitarian standpoint.

Above we have a number of sketches, anyone of which might appeal to some reader of MOTOR AGE who has a homeless car.

As time goes on and space permits, we hope to print many plans and elevations of private garages, including all known varieties.

By Tom Wilder

From the Woman's Viewpoint



If Uncle Sam should call his soldierette to war he will find her a skilled and ready ambulance driver, judging from this photograph of Miss America and her Studebaker six converted into an ambulance. The picture was taken somewhere in California

The American Women and Liberty Bonds

THIS is a war not of the few or of the many but of all. This includes the women, those who aspire to be soldiers, if the laws of custom change to permit it, those who train to be ambulance drivers, if the opportunity comes, those who offer to do anything, whether they are prepared to do it or not, and all those countless women who have no special gift of ability.

You do not have to fight to help. You need not change from a motorist about town to an ambulance driver to aid. You are not obliged to go into another field of work. No matter what you can do, there is something you can do.

The greatest part the women of America will play in the world war is that of sacrifice. She is an artist in this than whom there is no superior, or equal. She sends her all and does without in their absence. But the sacrifice is not all instinct, as some would have us believe. It is for the women and children, the homes, that a great part of the war for humanity's sake, in the greatest part, is waged. For that reason, let no woman feel herself unable to do something to help the country now that it is at war. Let's sacrifice with forethought, if that is the only way to help.

The Liberty Loan is the biggest opportunity that has come to the American woman so far in the war. True, there has been the Red Cross work, which means so much now and in the future. But the Liberty Loan is as great.

That the women of America had their part in this bond issue from the beginning was evident in the early recognition by the Government of subscriptions by women. The Women's Liberty Loan Committee was formed with Mrs. William G. McAdoo, chairman, and Mrs. Carrie Chapman Catt, Mrs. Frank A. Vanderlip, New York; Mrs. Antoinette Funk, Mrs. George Bass, Mrs. Kellogg Fairbank, Chicago; Mrs. J. O. Miller, Pittsburgh, Pa.; Mrs. Guilford Dudley, Nashville, Tenn.; Mrs. Frank S. Higginson, Boston, Mass.; and Mrs. George T. Guernsey, Independence, Kan., all of whom are prominent in women's affairs.

The bond issue is to close tomorrow. The last week has been spent in a whirlwind campaign in the larger cities. This is the appeal:

Bonds or Bondage!
Which Do You Choose?
Will You Let Your Country BE Conquered?
Or Will You Do Your Part to Help Her Now?
The Men of America Are Fighting YOUR Fight.

Stand Back of Them!

For Them,
For Your Country,
For Liberty,
For Democracy,
For Yourselves,
For Your Children,

BUY A LIBERTY BOND!

It is the Safest Investment in the World.
The United States Government Guarantees It.

It Pays 3½ Per Cent Interest.
Its Income Is Not Subject to Taxation.
If You Have Not \$50 Now,
Buy a Liberty Bond on the Instalment Plan

Any bank will tell you how you may subscribe.

If you cannot buy a bond for yourself,
Interest your neighbor.

If you want

A FREE, UNCONQUERED, SAFE,
SECURE AMERICA
work now

FOR THE LIBERTY LOAN.

"Wish Bones, Jaw Bones, Back Bones"

THIS is the time of the year of highway reports, and among the reports now going the rounds of interested persons and concerns are those of the Dixie highway. The Dixie highway has more than one way of making a report, however, and the variety is due to the part that the women of the Dixie Highway organizations play. Bibb county, Georgia, holds the auxiliary of women road boosters who are the authors of this novel road report, which was prepared by Mrs. Orren W. Massey, secretary of the Bibb County Dixie Highway Auxiliary, and made public by Mrs. W. P. Coleman at the Good Roads Day in Macon, Ga., this spring. The report says:

"The Dixie Highway Bibb County Auxiliary is composed of 100 members—and a purpose.

"Bibb county is composed of 65,000 inhabitants divided into three classes, according to the rules of anatomy. They are Wish Bones, Jaw Bones and Back Bones.

"The Wish Bones are always wishing for good roads.

"The Jaw Bones are always jawing about bad roads.

"The Back Bones are always working for good roads.

"The Bibb County Dixie Highway Auxiliary is the backbone of all the highways of Bibb.

"The membership includes both men and women. The women do the work and the men do the riding around.

No Dues, Hot Air

"There are no dues, but members are expected to furnish plenty of hot air and gasoline.

"Money is raised by the sale of the Dixie Highway emblem. It fits any car and is a badge of highway brotherly love. The cost is \$5. This amount gives the possessor not only the emblem but a voice in the Dixie Highway council and one year's subscription to the Dixie Highway magazine, published in Chattanooga. By this he is also made a member of the Dixie Highway Auxiliary.

"Unlike the poor—the Dixie highway is not with us always. Unless it is kept in good condition it lies within the power of the Dixie Highway commissioners to serve it up on a silver platter to another section.

"We have in this county 25 miles of Dixie highway. The auxiliary has lately finished placing markers over the entire route, both metal signs and painted posts.



The Motor Car Repair Shop



Proper Method of Cutting Paper Gaskets

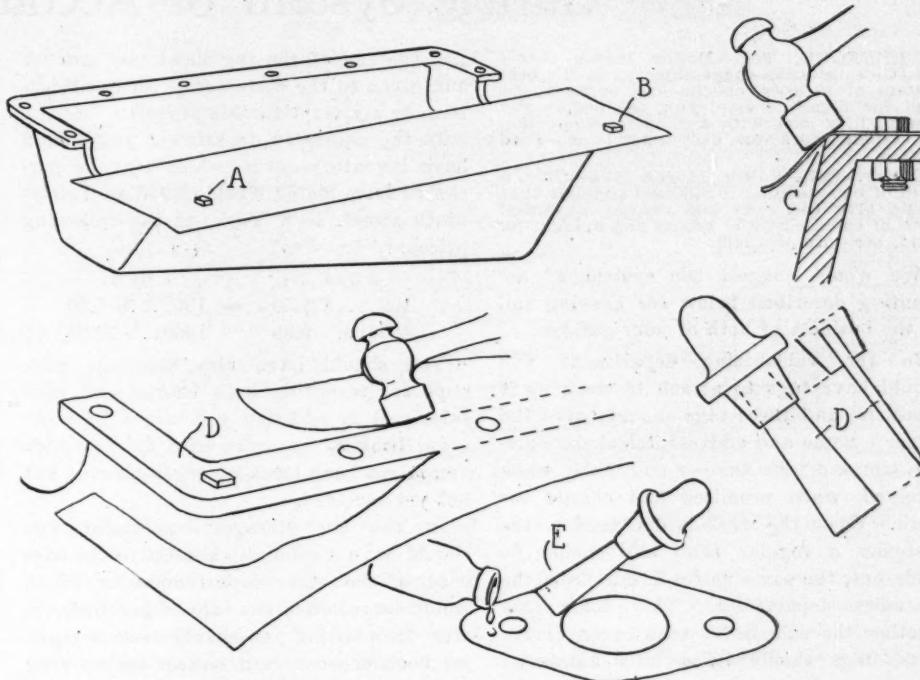
IN REMOVING the cylinder block from the crankcase the paper gasket is frequently torn from adhering to either the crankcase or cylinder flange. If the gasket is ruined completely a new one must be made and the proper method of carrying this out is shown in the accompanying illustration. The things needed consist of a sheet of good wrapping paper, a ball pein hammer and a bottle of shellac. About the only place where paper gaskets are used on motor cars is the joint between the cylinder block and crankcase, and under the cover of the gearbox.

No matter how irregular the shape of the gasket might be, it can, if the following instructions are carefully followed, cut with comparative ease and an absolute fit assured.

The first step is to scrape all of the remnants of the old gasket off the flange of the crankcase, assuming that it is desired to cut a gasket for this particular part of the engine. In scraping off the old gasket it is very necessary to get all of it off, otherwise there will be high spots on the flange which will prevent the new gasket from lying smoothly. An ordinary scraper such as used by cabinet makers will do for this particular part of the job. Now cut the wrapping paper to a little larger size than that of the required gasket and lay it upon the crankcase as shown in the upper part of the illustration. Hold it in place with the left hand at one of the corners and with the ball or pein end of the hammer tap out the hole into which the holding-down bolts of the cylinder block pass. It is only necessary to strike light blows for this and the hammer will do a nice job of cutting out the hole.

In Disk Form

The paper cut out of this opening will be in the form of a disk and can be pushed through the hole with the finger. One of the bolts of the crankcase is now passed through the hole in the paper and flange and a nut put on the other end, thus holding the paper firmly to the surface of the flange. This bolt is shown at A. Exactly the same thing is done at the other end of the crankcase and here the bolt is shown by B. These two bolts will prevent the paper from shifting and the gasket itself can now be cut. Before using the hammer it is a good plan to rub over the surface of the paper with the fingers along the lines where the gasket is to be cut. If the fingers are dirty, so much the better, as this will leave a black line on the paper around the flange, giving the exact size and shape of the latter. This makes an ideal pattern and no difficulty will be ex-



Sketches to illustrate proper method of cutting paper gaskets

perienced in following it with the hammer, although really the sharp edge of the crankcase is the guide for the hammer. This cutting edge is shown at C, as well as the angle at which the hammer is to be held.

At D is shown the way the gasket will look while it is being cut, and if the work is properly carried out, it will be surprising how nicely cut the edge will be and the gasket will conform exactly to the shape of the crankcase flange. The hardest part of the work is to hold the paper in place while the gasket is being cut, but if the holes described above are first made and the bolts inserted, no difficulty should be experienced.

When the gasket has been cut it should be given a coat of shellac and allowed to dry for a short while. There is a right way and a wrong way of applying the shellac. One way is to pour a little shellac on the gasket and spread the liquid over the paper surface with the fingers. While this will do the job, the fact remains that shellac is anything but pleasant when it comes in contact with the fingers and begins to dry. A much better and pleasanter way of handling this substance is to make a wooden stopper for the shellac bottle and into the lower part of the stopper cut a slot for fitting a wooden spreader as shown at D. This spreader is made with a feathering edge and cut to such a length that it will reach to almost the bottom of the bottle. When it is de-

sired to use the shellac, the bottle is inverted for a moment with the stopper in place and then the latter removed and smeared over the gasket as shown at E.

Rust in the Springs

If the average car owner would only bear in mind how important it is to keep the springs lubricated, surely many mysterious squeaks would disappear, to say nothing of the easier riding of the car and the increase in the mileage of the fuel. If the springs are rusty and dry the leaves will stick together and every time the car strikes a bump, the engine has to lift the entire weight of the car in going over it. This means more work for the engine and consequently more consumption of gasoline. If, on the other hand, the springs are kept well oiled, the body of the car will be carried along in a horizontal line with very little vertical action because the spring leaves take care of this by properly sliding upon one another. In other words, the spring action takes place so quick that the body will literally float along due to its inertia. The joints of the links connecting the springs to the frame should also receive proper oiling frequently. When doing this it gives the owner a chance to inspect the nuts on the spring clips which have a tendency sometimes to work loose. These nuts must by all means be kept tight, for otherwise the whole strain comes upon the bolt which holds the spring together at the center.



The Readers' Clearing House



Garage System of Accounting

H EREFORD, Tex.—Editor MOTOR AGE—
Give us some suggestions as to the best system of records, checks and books to be kept for a garage employing ten people and storing fifty cars with a shop in connection for repair work on cars and tires.—Ford Garage.

Culver, Ind.—Editor MOTOR AGE—Give a form of bookkeeping for garage supplies that would give the cash and charge accounts; price of each, cost and profits and amount on hand, etc.—Ralph Cook.

We would suggest the system of accounting described below for keeping tab on the business of both of your garages.

In the vulcanizing department you should have tags to attach to work as it comes in, and these tags should carry the owner's name and address, telephone number, tire and tube number and make, when received, when promised and charge for work. When the work is delivered to the customer a regular sales slip should be made out, the same as for a sale from the accessory department. This holds true whether the sale is for cash or on credit. These tags should be serially numbered.

and the end of the tag should be torn off and given to the customer as an identification, or a receipt for his property.

In the accessory department you should have inventory cards, which may be purchased from Motor World, 239 West Thirty-ninth street, New York, at the following prices:

4 by 6	5 by 8
100....\$ 1.00	100....\$ 1.25
1000... 9.00	1000... 12.00

You should have also standard sales slips for recording both charge and cash sales and in addition you might have an order book or an order card file in which you might keep track of goods ordered but not yet received.

In the car storage department you should have a sales slip similar to the ones used in the other departments on which would be recorded the sale of gasoline, oil, etc. In addition you should have a register book or some card system for showing

when cars come and go, a tag for transients so that, when a stranger brings a car in, the car will be tagged and the customer will receive a coupon without which he cannot obtain the car. This card should have a space on it for directions regarding washing and polishing, filling with oil and gasoline, etc., and also columns for recording the charges for these services.

Every member of the organization should have a time card, and it is desirable to have a time clock so that there will be no mistakes or misunderstandings regarding when a man comes to work and when he leaves. A satisfactory type of card is described below.

You should have a bill-head or statement for recording the number of charge sales to each customer, and this should be presented at the end of the month.

Figs. 1 and 2 show two sides of the work card. The front is made out in triplicate. One of these cards is used every time a

Name <u>John Smith</u>		Date Job No. <u>831</u>
Home Address	<u>Cedar Ave</u>	Business address <u>50 High St.</u>
Phone	<u>293M</u>	Phone <u>Main 62</u>
MOTOR NO. <u>46854</u>	LICENSE NO. <u>A 3443 N.Y.</u>	SPEEDOMETER <u>27385</u>
INSPECTION		DIRECTIONS
MOTOR		<u>✓ Remove Carbon</u>
Valve tightness		<u>✓ Sound Valves</u>
Valve adjustment		<u>✓ Take up rods</u>
Carburetor adjust.		<u>✓ Clean crankcase and fill with new oil</u>
Fuel strainer		<u>✓ Recharge battery</u>
Vacuum system		<u>✓ 4 new spark plugs</u>
Spark plug points		
Breaker points		
Spark timing		
Carbon deposit		
Radiator connections.		
Fan Belt		
Cutoff operation		
Voltage regulation		
Tight connections		
Good insulation		
Starter operation		
Battery condition		
New oil in motor		
CLUTCH		
Cleaning		
Adjustment		
Lubrication		
GEARBOX		
Lubrication		
Adjustment		
DRIVING MECHANISM		
Universal lubricant.		
Adjust. Bevel gears		
Lubrication		
Brake adjustment		
Wheel bearing adjust.		
Wheel bearing lubricant.		
Wheel alignment		
Steering gear adjust.		
Steering gear lubricant.		
Headlight focus		
Tire condition		
Speedometer testing		
Spring lubrication		
All nuts and bolts tight		

Fig. 1—The work card gives complete information concerning the customer and his car and inspection column

Fig. 2.—The reverse side of the work card contains a complete record of labor and material used

customer requires work done on his car, whether the work is free inspection service or regular repair work.

The name of the customer (John Smith), his home address and phone number are placed on the card. All this information is necessary in order that he may be reached without loss of time.

The date and the number of the job are also placed on the card; the job number, as you probably know, is a simple means of identifying that particular card. All the jobs which come into your shop after installing this system will be numbered from 1 up consecutively.

The engine or car number, the license number and the speedometer reading should also be placed on the card.

The license number affords a ready means of identification when the car is in the shop or at any other time, and it is particularly advantageous in a large shop. Furthermore, if the customer is a stranger and should take his car out without paying his bill it would enable you to trace it by writing to the secretary of state. If the customer is a transient it enables you to obtain his address from the secretary of state in case he only gives you his name—or possibly not even that, if the job is a small one—and thus you can send him a letter from time to time so that whenever he is in your neighborhood he will be likely to come to your garage for any further work.

Engine Number Is Necessary

The engine number is a necessity as an absolute means of identification in case the car is sold and the license number is changed, or in case the numbers are damaged or prove defective. This has been the case thousands of times in New York state in the last year. At the present time a license number in this state is a poor means of identification.

The speedometer mileage should be recorded so that any mistakes by the owner regarding the mileage of the car may be verified. For example, suppose that you did some repair work and after two weeks the car had given trouble after running 200 miles. If the speedometer showed 10000 miles this would naturally put a different complexion on the matter.

There is a column at the left of the card for service inspection work, and this should be checked. It is not necessary to copy this list, but this is merely a suggestion and you may add or subtract items as you see fit. This list should be helpful in not only performing any free inspection service which you may be called upon to do in connection with new cars, but also may be used for regular inspection work, which many owners now have done. We do not know whether you are doing any of this or not, but you will find that many owners will be glad to pay you, say, \$5 for a monthly inspection of their car.

Very full directions regarding the work to be done on the car should be written in the spaces allotted for this, and at the bottom of the page.

Upper—Fig. 3—Requisition card for obtaining new parts. Right—Fig. 4—Daily time slip for worker. Fig. 5—The mechanic is paid according to the hours recorded on the time card.

tom the date when the work is promised should be inserted.

The signature of the owner authorizing the work should be obtained in every case so that there can be no dispute as to what was ordered when the time comes to pay the bill. If after this work has come in, it is found that there are several additional things to be done, the owner may be called on the telephone and the permission obtained; but, in addition, it is wise to have his consent in writing, and consequently these additional items should be placed on the work card and mailed to him for his signature.

After the job is completed it should be tested by someone, usually the foreman, and when the car is delivered the owner should signify that everything has been done to his satisfaction by signing at the bottom of the card.

When the job is started the original should be filed in the office, a duplicate should be given to the owner, and another carbon copy, which should be on card-board, goes to the shop to be attached to the car. The signatures on the bottom of the card should appear on the office copy.

Fig. 2 shows the reverse side of the card, and this may be either the copy kept in the office as a matter of record or the copy which goes on the car in the shop; or it might be wise to have this information on both copies, according to circumstances.

All work done on the car is recorded on the card. For example: The first job listed was done by "Bill" on Dec. 26 and was grinding the valves. He worked from 9:30 to 2:30, which was 4 hrs., and at 60 cents an hour the total was \$2.40. "Jack" and "Ned" also did work on this car.

The lower half of the card records the material used, the first item listed being twelve piston rings, which were obtained from the stockroom by "Jack." They

cost 25 cents apiece, which brings the total to \$3.

If your shop is a small one the complete record of time and material may be kept on the back of the work card attached to the car. This work should be done by the foreman, superintendent, or, in a very small shop, by the owner himself. For example, when "Bill" starts grinding the valves the foreman would get this card, writing down the dates, "Bill's" rate (60 cents), the starting time (9:30) and, later, the finishing time (2:30), the total time (4 hrs.), and the cost (\$2.40).

Likewise, when "Jack" wants twelve new piston rings he goes to the stockroom and gets them, and records the fact on the card, as shown.

Keeping the Record

Inasmuch as this card is subject to frequent handling and is likely to become dirty, it is advisable to make these entries on the work card in the office instead. In a small shop this card might be kept on a desk in the shop.

In a larger shop the full record would be kept on the card in the office and would be done by a clerk.

The clerk would be informed as to the work done on the car and the material used by special slips. Thus, the record of "Jack's" purchase of twelve piston rings would be obtained as follows: "Jack" would get a requisition blank, Fig. 3, and fill it out, as shown. Then he would take it to the foreman for his approval, who would put his initials on it. Without this signature the stock boy or clerk would not give "Jack" the rings. Then "Jack" takes the slip to the clerk who has charge of the stockroom and obtains what he desires. At the end of the day this slip is forwarded to the office and the next morning the clerk who does the bookkeeping would transfer this data to the work card.

The Wheeler & Schebler company tries to maintain a velocity of about 10,500 ft. per minute at the carburetor throat, with the engine under full load at 1000 ft. per minute piston speed.

Although the displacement of the engine is to some extent a guide to the carburetor size necessary, it does not always work out that the size is in direct proportion to the displacement. For example, a 3 by 4-in. engine of a certain design and make may require a 1-in. carburetor, while another engine of the same dimensions may do the work just as well with a $\frac{3}{4}$ -in. or even a $\frac{5}{8}$ -in. carburetor. The make and type of carburetor enters into the matter also.

A well-known carburetor company uses the following formula for determining the throat size:

D^2LN

$$\text{Square root of } \frac{150,000}{150,000}$$

where D is the bore of the engine in inches, L the stroke in inches and N the maximum r.p.m. at which the engine will be run when driving the car on high gear.

In determining the nominal outlet size of the carburetor the denominator 70,000 is substituted in the above equation. Thus an engine with a maximum speed of 2000 r.p.m. and with a bore of 4 and a stroke of 5 in. would have a 1½-in. carburetor

16 by 5 by 2000

for the square root of $\frac{150,000}{70,000}$ equals 70,000

1.517 or about 1½ in.

The equation above gives, through the carburetor throat, an actual velocity of between 33,000 and 35,000 ft. per minute under wide open throttle and maximum engine speed.

—The small Schebler carburetor used for motorcycles ought to be about right for this, although it is capable of handling engines of considerable more bore and stroke.

HOW IGNITION SYSTEMS DIFFER

Two Systems of Ignition on Pierce-Arrow Explained

Des Moines, Iowa—Editor MOTOR AGE—Explain the difference of Dual, Duplex and Double ignition.

—How does the Pierce-Arrow use the Dual, Double?—A. S. Harrison.

—In the dual system of ignition there are two sources of current and one set of plugs, either source of current being available at any time. In double ignition there are two sources of current and two sets of plugs but only one set sparking while the engine is running. Either set of plugs may be used with its current source operating. The duplex system combines a battery circuit with a high-tension magneto arranged so that while the magneto circuit is complete in itself, the battery circuit includes the battery and coil which acts in conjunction with the magneto. The same set of plugs is used for the magneto and battery both. The battery side of the outfit is not intended to be used as a separate ignition system, but merely as

an auxiliary to the magneto to insure easy starting by cranking.

—The Pierce-Arrow has two ignition systems, each entirely independent and each having its own set of plugs. The first system employs a Bosch high-tension magneto. The second system draws its primary current from the storage battery. This current is distributed by the commutator to the master vibrator and unit coils where it is stepped up to high-tension secondary and then to each spark plug. Either of these systems may be switched on at will, or they may be used together.

Saxon Ammeter Wiring

Dayton, Ohio—Editor MOTOR AGE—Publish a diagram showing the method of connecting the ammeter on the new 1917 Saxon four. A Wagner two-unit instead of the Detroit now is used.—C. H.

This is shown in Fig. 7.

Chalmers Engine Misses

Ellis, Neb.—Editor MOTOR AGE—My Chalmers 6-30, 1917 model, misses on the first three spark plugs. The last three fire all right, but the first three get dirty, soot up and miss and will not fire until you take them out and clean them; then they work for a short time. What is the trouble?—Clarence L. Nickerson.

Although your description is not detailed enough to give a very definite clue, we would surmise that you are using an improper weight of oil. Try a lubricant with heavier body and see if the trouble is not eliminated.

Antimony in Battery Plates

Wichita, Kan.—Editor MOTOR AGE—in the lead plates for storage batteries what is the correct proportion of antimony to lead?

—What is the correct proportion of sulphuric acid to red lead in the positive plates and of acid to the cell charge in the negative plates?—V. H. McDonald.

—This varies with different makes of batteries but usually runs from 6 to 8 per cent.

—Inasmuch as the formulas of each concern are different and patented, it is not possible to give this information. If one concern gave out its formula the latter could be used by its competitors to good advantage. Thus the battery makers are reluctant to give out this information. Furthermore, this information would not

do the average person much good for no one outside of a manufacturer can successfully mix material and paste the plates properly.

DRY CELLS HELP STORAGE BATTERY

Method of Wiring for Auxiliary Ignition System

Chicago—Editor MOTOR AGE—In a battery starting, lighting and ignition system all in one unit, is there any way of connecting some dry cells to the ignition in case the storage battery runs out?

—If the platinum points in a magneto are too close or too far apart, what takes place in the magneto that stops the spark?

—I have noticed that on some starting, lighting and ignition systems the positive side of the battery was grounded and on some the negative side was grounded. Which is the best to ground?

—Could you explain to me the difference between alternating and direct current?

—How is a low-tension current stepped up to a high-tension current?

—I have seen storage batteries with four connections on them. Is this better than the two-connection battery and how are the four connections connected?—Jack Sacks.

—In Fig. 9 is shown a method of connecting dry cells to furnish current for ignition in case the storage battery becomes exhausted in such a system as you mention. Usually in a system of this kind the current for ignition is furnished by the storage battery to begin with, and after the engine is started the generator supplies current when it has reached a certain speed. When the dry cells are used, the current is furnished in the same manner as though it came from the battery. The generator may then be used to charge the battery. The switch shown at A closes the circuit when the storage battery is used, and B when the cells are used. On some systems A and B are so arranged that they control both the ignition and the circuit between the generator and storage battery. Thus when switch B is closed and ignition is being supplied by the cells, switch A can be so arranged that contact is made at C, closing the circuit between the generator and storage battery, in which case the latter will be charged. This does not mean that the storage battery should be removed from the circuit.

—If the points are set too close, the secondary does not have a chance to build

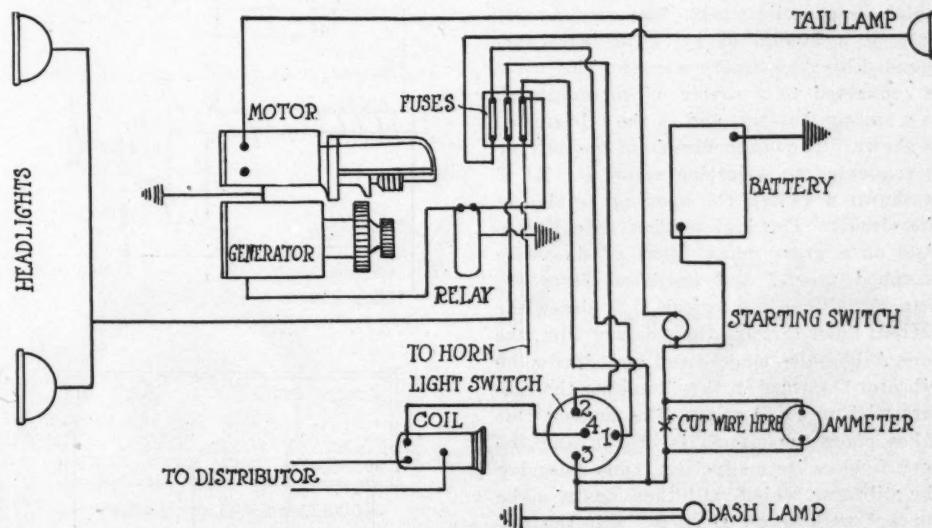


Fig. 7—Diagram showing method of connecting ammeter on new 1917 Saxon four, using Wagner two-unit

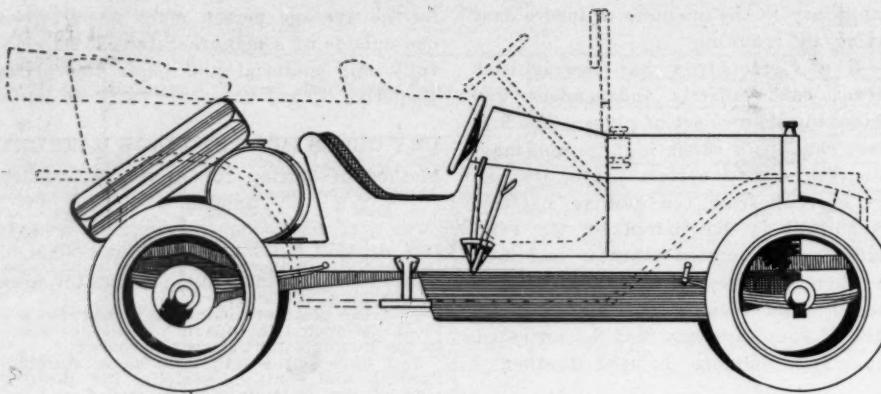


Fig. 8—Rebuilt 1910 Cadillac touring car, keeping in mind the cost

up sufficiently in voltage to produce a spark. When too far apart, the resulting high tension current will cause undue wear of the platinum points, because the latter will come together with more force than necessary. This will eventually make the points stick from becoming pitted and the magneto will cease to fire.

3—In the majority of cases the negative side of a storage battery is grounded, although it really makes no material difference whether the negative or positive side is grounded, as far as the flow of current is concerned. For electrical reasons, the negative side of the battery ought to be grounded and you will find this to be the case in the installation of most electric systems.

4—An electric current is said to be alternating when it flows rapidly to and fro in opposite directions. The number of alternations per second is known as the periodicity. For instance, a current that alternates five hundred times a second would be said to have a periodicity of 500. In a direct current, the flow is in one direction only. Magneto's generate an alternating current, while an ordinary dry cell or storage battery generates a direct current. There are, of course, other means for producing each type of current.

5—A low-tension current is stepped up to a high-tension current as shown in Fig. 10. This shows the basic principle upon which spark coils work. The core A consists of a bundle of soft iron wire surrounded by the primary wire B. The latter is connected to a source of current, such as a storage battery, and to the vibrator C, as shown. The other wire from the battery is connected to adjusting screw D. At E is shown a switch for opening or closing the circuit. The high-tension wire F consists of a great many turns of fine wire wrapped around and insulated from the primary. When the switch E is closed the current flows through the primary wire, the core A becomes magnetized and draws the vibrator C toward it, thus breaking the contact with screw D at G. The moment this takes place the circuit is broken and the core A loses its magnetism, thus releasing the vibrator which will then again make contact with screw D at G. But the moment this contact is made again, the core will once more become magnetized and

draw the vibrator towards it. This action goes on and is repeated so fast that the vibrator buzzes. When this vibration takes place, a current is induced in the secondary wires F by "induction" and intensified to such a pressure or voltage that it will jump the gap at H. The latter may, for convenience, be called the gap at

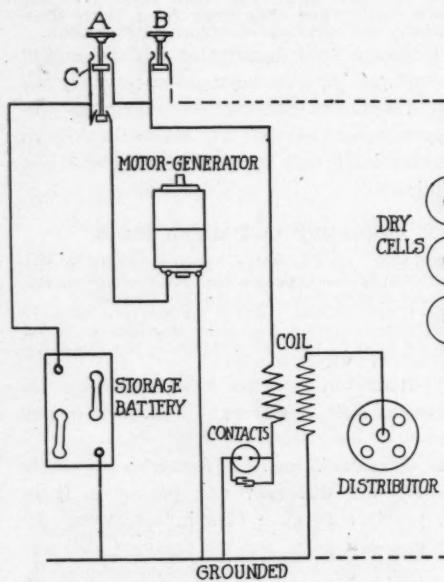


Fig. 9—Method of connecting dry cells in case storage battery becomes exhausted

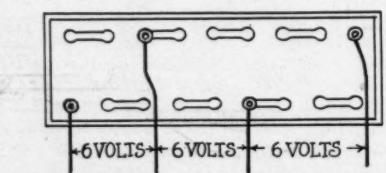
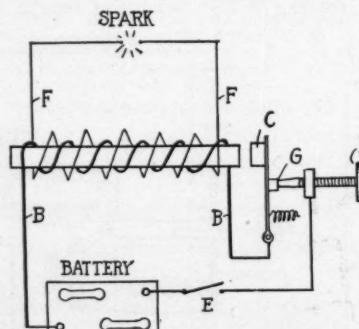


Fig. 10—How low-tension current is stepped up to a high-tension current

the spark plug points. The current which jumps this gap is known as a high-tension current.

6—You probably have seen what is known as a twelve-cell 24-volt battery, which could be made into three separate circuits of 6 volts each. This would mean that the battery would have two extra terminals on it, as shown in Fig. 10, together with the regular terminals on each end of the battery.

HOW TO DROP STEERING WHEEL Rebuilding 1910 Cadillac Touring Car into Speedster

Argos, Ind.—Editor MOTOR AGE—Would like to rebuild my 1910 Cadillac touring car into a speedster as cheaply as possible. Give sketch showing how car would look when rebuilt.

2—What would be the approximate cost of rebuilding?

3—How can the steering wheel be lowered?

—W. A. Meloy.

1—An illustration showing how the car might be rebuilt is shown in Fig. 8.

2—This is hard to say, because it will depend upon how much of the work you expect to do yourself. If you follow out the design shown, the cost would be about \$100. This does not include tires on the back of car, however.

3—To do this you must fit wedges of wood under the frame bracket and also the bracket on the dash or floor boards. In all probability you will have to drill new holes in the frame for the steering post bracket because the latter will be swung at a steeper angle. There are many parts houses which can furnish you brackets for this and it is only necessary for you to state to them the angle at which you expect to place the steering post and the diameter of the latter.

OPERATION OF FORD TRANSMISSION

How Lost Magnetism May Be Restored to Magneto Magnets

Powhattan, Kan.—Editor MOTOR AGE—How does the Ford transmission operate, and show diagram of how power is transmitted through it?

2—How does the Ford magneto operate?

3—Has it magnets?

4—How is a magnet charged? What size wire is used and how wound?—R. W. Manahan.

1—A sectional view of the Ford planetary transmission is shown in Fig. 12. The driven gear is shown at D. By pressing the low speed pedal a brake is applied to the drum BB, and by doing this the gear F is held stationary and the pinion P rolls upon it. The pinion P1 causes the gear B to turn slowly, which constitutes the slow speed. For high speed, the whole mechanism is locked by means of the clutch plates in drum C, and the whole unit turns around acting as an additional flywheel. None of the internal parts of the transmission turn around when the car is in high gear. For the reverse, a brake band is applied to the drum V. This holds the gear L stationary and the pinion K rolls upon it and the pinion P1 causes B to move in the reverse direction.

2—The Ford magneto and its various parts is shown in Fig. 11. This magneto is of the revolving field type, which means

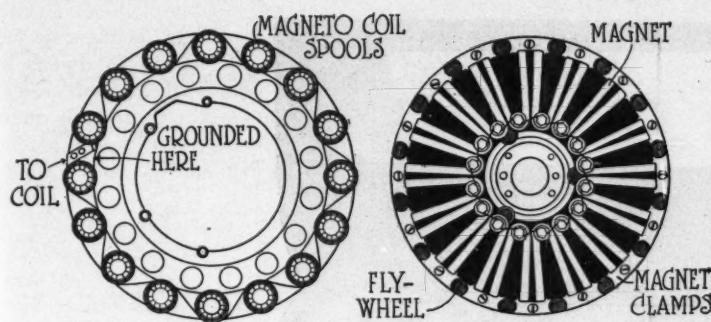


Fig. 11—Ford magneto and its various parts

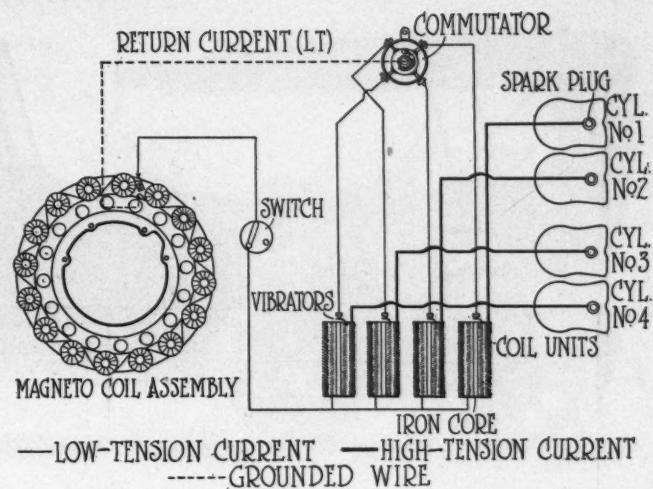
that instead of having the magnets or field-producing element remain still and the coils and armature revolve, just the opposite takes place, that is, the field revolves and the armature remains still. In the illustration is shown the flywheel to which are attached the magnets, by means of clamps. This is the revolving element, while that at the left, consisting of the windings, is the stationary part. The stationary part is fastened to the cylinder block, while the revolving part is attached, as before stated, to the flywheel. There are sixteen coils, all connected, and as the magnets revolve past them, there is induced within the coils a current of low voltage. As will be seen, one end of these coils is connected to a common wire which is grounded, while the other end is led to the coil on the dash where the current is stepped up to a high voltage suitable for ignition.

Ford Wiring

The illustration also shows the Ford wiring, and it will be noted that there are two wires leading from the magneto, one going to the switch and the other to the ground, shown by the dotted line. The magneto current will flow through the switch and through the coil with which the commutator arm is making contact. That is, if the commutator arm is on No. 3 segment then current will flow through the low-tension winding of coil No. 3, then through the commutator and to ground and then back to the magneto. In passing through the low-tension winding of the coil the current is interrupted and a high-tension current is induced in the secondary of the coil. This high-tension current passes immediately to the spark plugs, where it is grounded. The circuit is thus complete, inasmuch as the secondary of the coil is grounded also.

3—Yes, sixteen of them, as the illustration will show.

4—In order to charge magneto magnets direct current is used. With an alternating current it will be necessary to use a rectifier of some kind. This means that the alternating current entering the rectifier will come out as a direct current. As far as the actual charging of the magnets is concerned, this is done by means of an electro-magnet. This apparatus comprises two coils of wire mounted upon a yoke and with suitable pole pieces at the top upon which the N and S poles of the mag-



nets to be charged are placed. The N pole of the magnet is placed upon the S pole of the charger when the operation of charging the magnets is carried out. Current is allowed to flow for a very short time only, as there is danger of overcharging the magnets if carried on too long.

Ford magneto magnets can be charged without taking them from the car and this was fully described in the Clearing House columns of MOTOR AGE issue of May 24.

The size and kind of wire to use in making a magnet recharger, as well as the quantity to use, can only be arrived at after much scientific calculation and experiment. This subject was extensively dwelt upon in the clearing house depart-

ment of MOTOR AGE in the issue of May 31.

American Scout Made Speedster

Garland, Tex.—Editor MOTOR AGE—Publish a sketch of an American Scout roadster 1914 model to be made into a speedster using the same radiator, hood and wheels and leaving the fenders off; also lowering the steering wheel as much as possible and have the cowl made back on it as much as possible; also have the seats, gasoline tank and tool compartment set as low on the frame as can be made.

2—Will there be any danger of the new steam cars shaking joints loose so steam can escape when going over rough roads, or are they all welded together?—F. C. Hodges.

1—A sketch prepared following your ideas will be found in Fig. 13.

2—No. Welding is resorted to wherever possible and all connections are firm.

Valve Timing on Flanders Engine

Louisville, Ky.—Editor MOTOR AGE—Would it increase the power to set the valve timing early on a Flanders 20 motor, say, three to four teeth ahead, on timing gears?—H. G. Kroeger.

It may do so slightly, but you would also find that you could not throttle down the engine quite so well as with the present setting. In changing the valve timing, it is a good plan to set the timing gears one tooth at a time and then try out the engine to ascertain whether or not the change is too radical. More power can be obtained from the engine by fitting a camshaft, the cams of which have a higher lift, thus holding the valves open for a longer period. Unless you are skilled in this kind of work, you had better not attempt it as it requires very accurate design and mechanical construction.

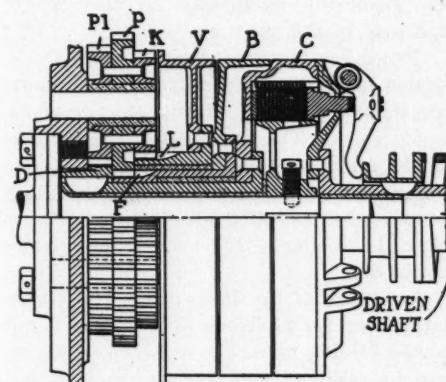


Fig. 12—Operation of Ford planetary gearset

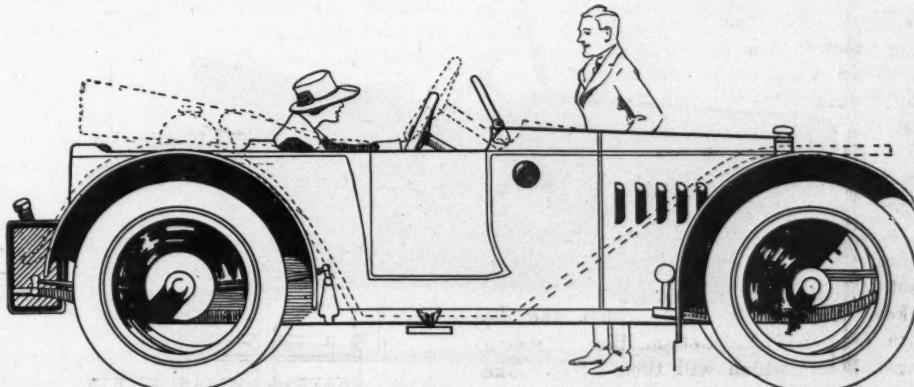
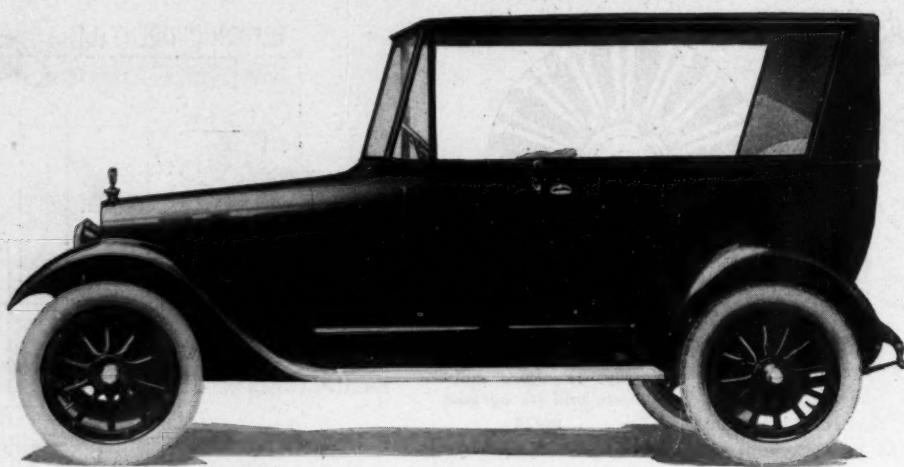


Fig. 13—Sketch of American scout roadster, 1914 model, made into speedster



The new Chalmers touring sedan is practically both an open and closed car. The windows may be dropped completely

Ten in Chalmers New Body Series

Cars Differ Little Mechanically

AMONG the first to make an announcement for the coming season is the Chalmers Motor Co., with an exceptionally complete and well-designed line of cars. Mechanically, the car differs little from the previous model—namely, in detail and minor refinements. But concentration has been placed on perfecting the body style.

Ten body styles are offered—each design to meet a definite demand and each complete in the details that tend towards owner's satisfaction. The line comprises a seven-passenger touring car, a five-passenger touring car and a standard roadster at \$1,350; a touring sedan, a three-passenger cabriolet, a seven-passenger town car, a town landau, a seven-passenger limousine; a limousine landau, and a four-passenger duplex model.

The limousine landau, selling for \$3,025, embraces many of the characteristics common to the other closed cars. It is finished in Chalmers meteor blue, with standard black finished parts. The cushions are deep and covered with Laidlaw cloth. The woodwork is of inlaid mahogany panel. All interior metal fittings are of the late Georgian-period design, styled "Countess Shelburne." The two dome

lights are of frosted glass and switch on automatically when the doors are opened. Another detail that lends refinement is a lady's vanity case concealed in one side of the car. Corresponding to this, on the other side, is a gentlemen's smoking set. These are operated by push buttons.

The rear compartment is connected with the driver's seat by a car 'phone set flush with the interior panel. This is thrown into operation by pressure on a push button. The auxiliary seats are reversible in the limousine landau, but this is not the case in the town car.

Two other features characterize the limousine landau. One is that all the joints are made watertight without the use of exterior irons. The other is that the leather in the folding rear quarter is specially prepared and bark-tanned, having the grain running horizontally across the back, so that the tendency to check is practically obviated.

A feature of the three-passenger cabriolet, selling for \$1,725, is that the top is not of the folding type. The windows, however, can be removed and, because they extend practically to the rear of the permanent top, leave the car exceptionally open, so

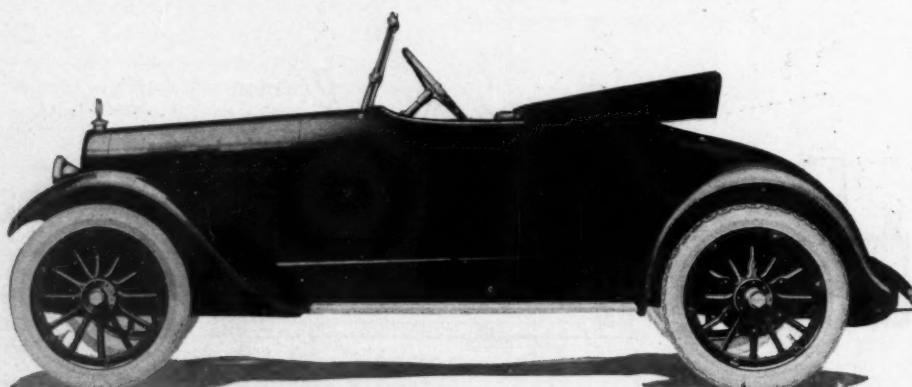
that the folding feature is not necessary. With the exception of the top construction the description of the limousine landau applies to the seven-passenger limousine. The lines of the hood and front compartment blend into those of the inclosed rear compartment, and the entire car is expressive of quality and craftsmanship. The same applies to the town car, which, of course, does not have the roof over the driver's seat. The continuity of lines here is emphasized by the tilted windshield. The windows are fitted with automatic regulators and silk curtains. In this model the auxiliary seats are not reversible, and a foot hassock is used instead of a foot rail.

The sedan should be an exceptionally popular model. With the windows in place it is a very attractive closed car, and with the windows removed it is practically an open car. The windshield is tilted, and the corresponding line at the rear is parallel to it. The effect given by the parallelogram inclosed between the straight top lines and the straight gunwale is pleasing. The windows may be dropped completely, together with the pillars which are placed beneath the rear seat.

The lower edge of the top, when up, is parallel to the top body edge and comes down quite close to it. It is, however, cut away slightly at the point of junction with the windshield.

The same care in design has been applied to the open cars. The bodies are streamline throughout, with no break between the hood and the cowl and with straight gunwales. The extreme tilt given to the windshields accentuates the streamline effect.

Another point that should tend toward ready merchandising is the fact that the price of both the seven and five-passenger touring car are the same. These differ slightly in design, the former being mount-



The new Chalmers three-passenger roadster combines snappy lines with roominess. This is a standard model

ed on a 122-in. wheelbase and the latter on a chassis of 117-in. wheelbase. The body lines, too, are different. The back of the rear seat in the seven-passenger is provided with a cowl that molds into the body lines. That on the five-passenger is separate.

The four-passenger model, styled the duplex, is the result of up-to-the-minute practice. In spite of the low hung body and rakish appearance, the seats are not too low, extend full across the car and are designed as much for comfort as for appearance. The steering post is tilted at an angle somewhat greater than that of the other models, as is the windshield. There is plenty of knee room in the front compartment, and the headlight and dimming switch are within easy reach of the driver on the instrument board. The body is somewhat narrower than that of the touring models.

Specifications of the Chalmers new body series include a six-cylinder engine, 3 1/4 by 4 1/2; 25 hp., S.A.E. rating; Stromberg carburetor; Remy ignition, distribution and high tension coil; Willard battery, 80 amp. hr.; Westinghouse two-unit starting and lighting system; Stewart-Warner fuel feed; and force and splash lubrication. The wheelbase of the five-passenger touring car and roadster is 117 in. All other models are on chassis with 122-in. wheelbase. The prices of the new series are:

Touring car, seven-passenger.....	\$1,350
Touring car, five-passenger.....	1,350
Standard roadster.....	1,350
Touring sedan.....	1,850
Cabriolet, three-passenger.....	1,725
Town car, seven-passenger.....	2,925
Town landau.....	3,025
Limousine, seven-passenger.....	2,925
Limousine landau.....	3,025
Duplex, four-passenger.....	1,475

NELSON FACTORY IN PRODUCTION

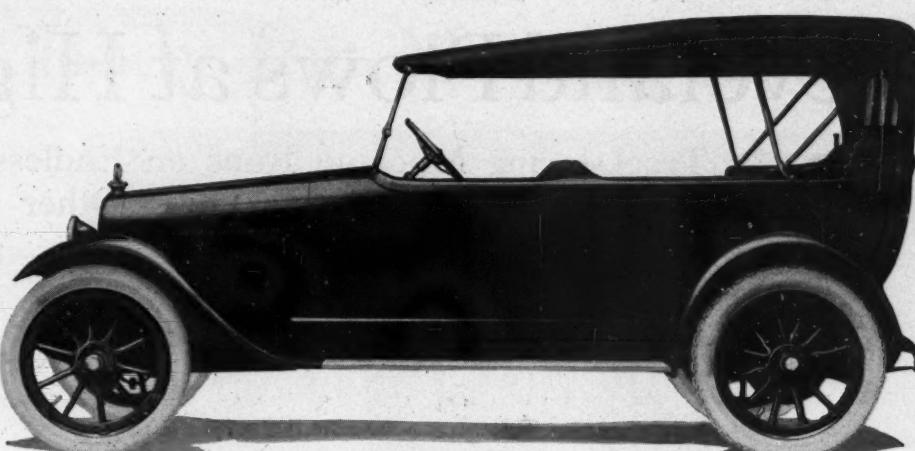
Detroit, June 8—The Nelson cars are now being turned out by E. A. Nelson at the rate of ten to twelve cars daily, with shipments in this number being made to distributors in all parts of the country. The factory in Detroit is concentrating on three types, a two-passenger speedster listing at \$1,200, a four-passenger at \$1,400, and a five-passenger sedan at \$1,800. This car was described in MOTOR AGE Dec. 28, 1916. It has a four-cylinder valve-in-head engine, with a special Zenith carburetor.

ALL-SEASON BUYS PAGE

Marshall, Mich., June 8—The All-Season Body Co. has taken over the factory and property of the Page Bros. Buggy Co. as was arranged under a contract entered into between these two concerns when the All-Season Body Co. was organized last December.

SAYS MARKERS ARE FADED

MOTOR AGE received the following letter from W. G. Aller, Stratton Park, Colorado Springs, Colo., with reference to markers on the Pike's Peak Ocean-to-Ocean highway. He says:



The seven-passenger Chalmers touring car differs from the five-passenger in that it has a 122-inch wheelbase instead of 117-inch.

"I have just driven over the Pike's Peak highway from St. Joseph, Mo., to Colorado Springs and find the roads well graded and well dragged, but the marking through some parts of Kansas is very poor. Some places right in towns where you need it the most it is the poorest. The old marks are faded until you cannot tell them from

'Yeast Foam,' or 'Bon Ami,' or some other advertisement. In other places the name of the highway has been obliterated from the signs entirely. There ought to be something done to remedy this as it makes it bad for the tourist, especially one who is used to well marked highways such as the Lincoln, Santa Fe, Yellowstone and others."

The Motorists' Bookman

Story of the Automobile

The motor industry has grown with such rapid bounds that few contributions have been made to it in pretentious history form. Its vogue, though universal, has been contemporary rather than historical in the few years of its growth to the present standing. The industry is ready for a concise representation of the struggle to invent a speedy, self-propelled carriage, the rapidity with which it developed industrially in the last two decades and a record, ready to hand, of the enormous financial returns. "The Story of the Automobile" was written to treat on these phases, among others, of the motor car.

The author is H. L. Barber, economist and financial writer, author of "Making Money Make Money." He states that his decision to write the book was due to his being unable to find a book which gave in concise form those facts about the motor car and the industry which persons want to know. Two chapters are contributions from others. Edward G. Westlake, motor editor of the Chicago Evening Post, has contributed one on "Amazing Figures of the Automobile Industry." The Business Bourse, International, Inc., gives a treatise, with charts and tables, on "Automobile, Accessories and Tire Manufacturers' Securities, from a Financial and Investment Standpoint." A. J. Munson & Co., Chicago.

ONE LICENSE TOO MANY

Hartford, Conn., June 8—The home of the wooden nutmeg and the land of steady habits sometimes falls for some peculiar things, not necessarily gold bricks, because they are a bit too raw, but for such simple little things as special dispensations in the use of one's chariot. As proof of this assertion consider that one Morris Bloom was arraigned before Judge George G. Griswold in the Berlin court on a charge of obtaining money under false pretenses. Bloom pleaded guilty and paid the \$100 fine. According to the police who made the arrest, Bloom was one of a gang occupied of late in selling the car owners of the town of Berlin special dispensation cards by which they might journey beyond the borders of this peaceful hamlet.

Holley Vaporizer

(Concluded from page 25)

oped with the idea of using kerosene as fuel, it is not our belief that kerosene will ever be used to any extent by passenger cars. Tractors and trucks can, without doubt, use straight kerosene to advantage; for passenger car use, however, we believe that a fuel will be developed which will contain more and more of the higher boiling point fractions which now constitute kerosene; in other words, that the fuel of the near future for passenger cars will approach the straight-cut fuel—i. e., that all of those fractions of petroleum below an end point of 600 deg. F. will be combined into the future engine fuel. The Holley vaporizer can utilize a fuel of this nature as well as kerosene, distillate, benzol, etc.

The fuel supply available from the present petroleum output would be vastly increased by the general ability of passenger cars to use such a straight-cut fuel, and this, together with the use of kerosene by tractors and trucks, seems to present the most logical and easily attained solution of the internal combustion engine fuel problem.

Cleveland Plows at Higher Speed

Track-laying Machine Runs on Endless Chain and Hauls Two or Three Bottoms—Other Peculiarities



Cleveland Motor Plow tractor in operation. The three pulleys above the side chain carries the weight

THE tractor being made by the Cleveland Motor Plow Co., Euclid, Ohio, has many points of peculiarity. Selling for \$985 it will haul two or three bottoms, but it does its plowing at between $3\frac{1}{2}$ and 4 m.p.h. instead of the 2 miles which is conventional practice. It is a track-laying machine running on endless chains with cast iron treads, and the weight and area of ground contact are such that the pressure per square inch at any point does not exceed 5 lb.; a man of average weight exerts a per-inch pressure of about $3\frac{1}{2}$ to 4 lb. on his shoe soles and heels. This means that the tractor will run anywhere a man can walk. Over a loose heap of granite chips or gravel it proceeds with a scarcely perceptible sinking in, and the imprint on turf is less noticeable than the track of a pneumatic tire.

Referring to the illustration, the weight of the machine is carried on the three pulleys or rollers seen above the chain on each side. The front wheels carry little or no weight and the rear wheels also have nothing to do except to push the tractor forward along the chain as it lies on the ground. In a track-laying tractor the chain, it must be understood, is not a driving chain in the way that a transmission chain is. The chain is merely a flexible rail, along which the tractor is propelled, and which the tractor automatically picks up and relays in front of itself.

Under the hood is a four-cylinder vertical Buda engine with a cone clutch of truck type. This drives to a two-speed gearset built integrally with a rear axle having bevel drive. Within the axle is incorporated the steering gear which is

operated by engine power. To follow the action imagine the transmission and differential with bevel drive exactly as in a truck, but instead of solid drive shafts from the differential to the rear wheels there is a planetary gear on either side. The differential driveshafts are connected to the rear wheels through the planetary trains, this giving a gear reduction in addition to that provided in the transmission and by the bevel.

The drive from the differential to either rear wheel is thus the equivalent of a planetary motor car transmission on low gear. To steer it is necessary to make one side of the machine advance more rapidly than the other, and this is accomplished very simply by applying a brake to either of the planetary gears, just as though the high gear was being gently engaged. A slight application will cause a turn to be made in a wide sweep, while full engagement gives one wheel twice the speed of the other and produces a very short turn.

DORT LOSES TO DART

Flint, Mich., June 11—The Dort Motor Car Co. has lost its suit for name registration in the patent office through opposition by the Dart Motor Truck Co., Waterloo, Iowa, but this was in one of the lower courts and the case will be carried higher. Even if the Dort company loses the suit in the higher courts, it will not in any way, according to J. D. Dart, affect the use of the name Dort as applied to the Dort company's products. The only effect there will be is to prevent registration of the name in foreign countries.

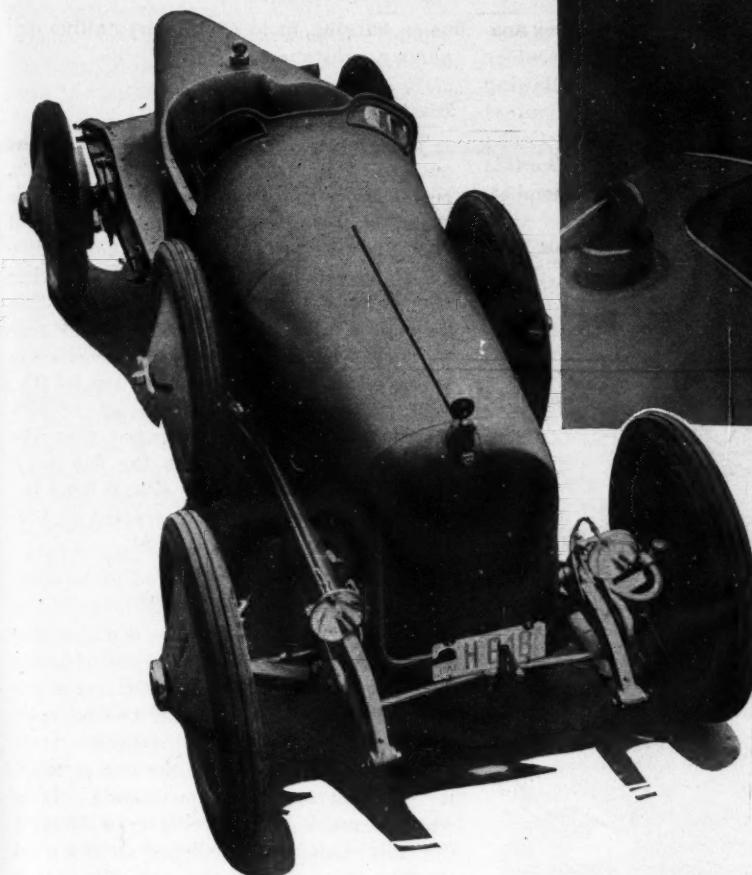
The effort required on the steering wheel is very slight.

The suspension is interesting, the front end being sprung and the rear solid. Each set of wheels and the chain track is carried in a frame free to pivot on the center line of the rear axle. Across the front, these two frames are connected together by a spring. A separate frame running forward from the rear axle carries the engine, radiator and, in fact, every other part. This layout allows the two chains great flexibility, since one can be running uphill while the other is running down, the only effect being to flex the front spring; no twist can possibly be transmitted to the engine frame.

The cast iron treads for the chains are made in short sections and are each attached to the chain proper by bolts slipped in and secured with cotter pins. It is very easy to replace any portion of a tread. Owing to the very small unit pressure on the ground the durability of the chains should be very great indeed; also the pivot pins are only transmitting driving force, while the links they connect are lying on the ground. The rear wheel pulls on the portion of the track ahead of it, but the weight of the chain is the only tension on the parts around the wheels or on the top.

It is claimed that the machine can be run on ground both wetter and drier than most tractors can travel over. It is even stated that successful operation over snow is possible. The rating is 12 hp. at the drawbar figured on a 4-m.p.h. speed and 20 hp. at the belt. The company hopes to make 4000 machines this year and already is turning them out rapidly.

New Racing Body for Mercer Chassis



The seats in the Ascot Speedway Mercer are staggered for convenience. Spot lights serve as headlamps

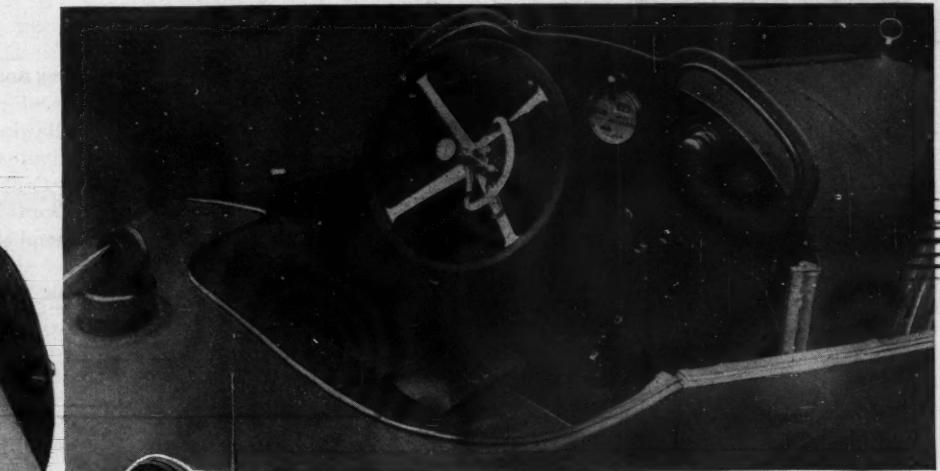
PRESENTING further advancement in designing the speedster type of body than anything that has been seen on the Pacific coast, G. E. Ruckstell, a former racing driver, has built for George R. Bentel, Los Angeles, what is termed the Ascot Speedway model. A Mercer racing chassis of the 45 type has been altered under Ruckstell's direction and a body that incorporates a number of innovations fitted.

In the combination of comfort with speed, Ruckstell has introduced through the Ascot Speedway model something new and at the same time created something smart in appearance. The detail work on the body is superior to that shown in the Peugeot, Sunbeam and other classy racing models that have been seen in this country. The tail has been tapered to preserve balance and at the same time reduce suction.

Not a Racer

Although capable of a speed of 100 m.p.h., this Mercer is not intended for racing. It was designed for the personal use of Bentel, who last fall brought out a Coronado Sport model which was particularly attractive.

In explaining the details of the new car, Ruckstell said: "We have followed generally the lines of the scientifically-con-



The gear lever of the new Mercer body "breaks" to give the driver more room in entering or leaving the car

Ascot Speedway Model's Chief Innovations Are for Occupant's Comfort and Include Roominess and Easy Access

structed 300 cu. in. racing cars of to-day. The car has racing construction throughout. The chief innovations in the body are for the occupants' comfort. Racing cars are very saving in room for driver and mechanician, so we have sought to add roominess, comfort, cleanliness and an easy exit and entrance. The latter feature is provided for by a door."

COMPLETES ORGANIZATION

Grand Rapids, Mich., June 11—The Highgrade Motors Co. organization which was announced in a previous issue of MOTOR AGE, will sell \$115,000 worth of stock still in its treasury at \$10 per share, which is the par value. The company is incorporated under the laws of the state of Maine for \$250,000, all common stock with a par value of \$10 per share. Approximately \$135,000 has already been subscribed for. The Highgrade truck is over 1500-lb. capacity, and, it is expected will be the highest priced truck on the market. The price has not yet been announced.

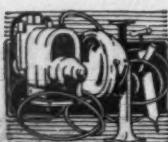
U. S. TRUCK SALES \$1,672,000

Cincinnati, Ohio, June 11—Sales of the United States Motor Truck Co. for the first quarter of this year totalled \$1,672,000.

Other added features are curved plate glass "kickups" in the cowl, electric lights, horn and disk coverings for the wire wheels. Two extra wheels are carried one on each side. To give free arm room to the driver, his seat is 8 in. in advance of the other. A tool box, ingeniously set in the floor, provides a foot rest for the passenger. A special feature is the gearshift lever that "breaks," so that it may be laid forward on the floor, thus increasing the ease with which the driver's seat may be entered. The accessories are complete, even to a watch on the end of the steering post. Spot lights that may be focused to any distance by turning a thumb screw, are used for headlamps.

Hotchkiss Drive

The motor, so balanced and lubricated that it runs coolly without a fan, is of the high-speed, large-valve type developing 90 hp. There is a three-speed gearset with multiple disk oil clutch. The rear axle is of Mercer stock with torque rod and Hotchkiss drive. The frame is of chrome vanadium metal, heat-treated. A stock radiator is used. The 25-gal. gasoline tank is carried in the tail of the car, while the oil feed is gravity from a tank suspended on the front of the dash beneath the hood.



The Accessory Corner



Outlook Windshield Cleaner

THE Outlook windshield cleaner consists of a rubber strip on the weather side of the windshield and is held in position by a rod on the inside of the glass. To this rod is affixed a hard rubber roller which holds the rubber strip close to the outside of the glass and produces a squeegee effect and permits the cleaner to act quickly and easily. Snow, rain or water is effectually wiped off at one sweep by moving the cleaner left to right or vice versa and a clear vision straight ahead is possible all the time. The cleaner is made by The Outlook Co., Cleveland, Ohio.

Steering Wheel Lock

This lock for the steering wheel is of the type which renders the wheel immobile, by locking the latter to the steering column. Essentially the lock consists of two steel collars, 1 and 2, the latter being pinned or keyed to the turning tubular shaft, while the other member is attached to a Yale lock bolt and moves up and down in grooved keyways. In operation the key locks these multiple-toothed collars in any position, making the steering wheel absolutely rigid, according to the statement of the maker. An effort will be made by the manufacturer of this lock to have it installed in leading makes of cars as regular equipment. Isaac Shular, Tulsa, Okla., is the maker of the lock.

Motorlife

This is the name given to a liquid which is intended to be put into the gasoline tank and mix with its contents, resulting, it is claimed, in greater mileage possibilities of the fuel. Two ounces of the fluid are put in the tank to each 10 gal. of gasoline and it is ready to do the work. Besides reducing fuel consumption, Motorlife is said to result in smoother running of the engine, easier starting, quicker pick-up, more power and in general add to the efficiency of the engine. No acid, ether, camphor or any other substance which can in any way harm the engine is contained in it, according to the makers. Carbon deposits will be greatly lessened by the use of the liquid,

it is stated. A sample of the liquid was analyzed recently by the Barrow Laboratory Co., Memphis, Tenn., with the following results: Specific gravity, 0.835 equivalent to 37 Baume; flash point, 2 deg. Cent.; fire point, 12 deg. Cent. In addition to this it was found to contain no ether, camphor, naphthaline, picric or other organic acid. Also it was found to leave no ash or resi-

due on burning, or to contain crystalline or gummy substances.

Electric Lighted Flagholder

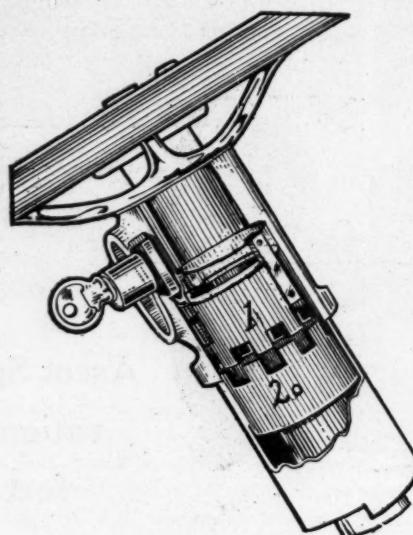
The electric-lighted flagholder, brought out by The Howe Mfg. Co., Chicago, makes it possible for car owners to have an illuminated flag on their cars. A special clamp is used to fit it to the radiator filler neck and can be applied without marring the metal surface of the radiator. The flagstaff is nickel-plated and made of tubing 12 in. long. This tubing conceals the wires going to the lamp on top of the staff. The reflector is made of heavily nickelated metal and so arranged that the rays of light are cast upon the flag only. The flag is made of heavy silk, 6 by 8 in., and the edges are heavily seamed to prevent fraying. The price is \$1.

Crew Levick Unit Tire Chains

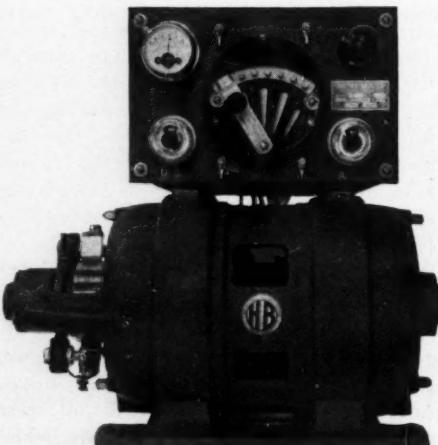
The unit chain, unlike the conventional forms, consists of a short length of chain which fits around the cross-sections of the tire and felloe only, so that one or more chains can be applied as desired. It is not necessary to jack up the car or move it along in applying the chains. If a wheel is stuck in deep mud or a ditch, a few unit chains can be slipped on and good traction assured, it is claimed. Essentially the chains consist of a double-ended bracket attached to the rim under the shoe. To the protruding ends of the bracket are attached the unit chains, which stretch across the curve of the tire, allowing the approved amount of slack. Economy is claimed for them, in that no side chains are used. A complete set of unit chains for two wheels cost \$4.80. They are being marketed by the Crew Levick Co., Philadelphia, Pa.

Tokheim Oil Wagon

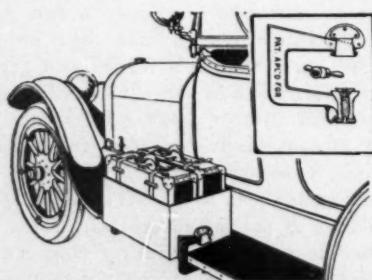
The Tokheim Mfg. Co., Inc., Cedar Rapids, Iowa, offers a solution of the oil handling problem by the introduction of its oil wagon designed for quick service at the curb. The outfit consists of two galvanized tanks of steel, each tank having a capacity of 20 gal., one for light and the other for heavy oil. Two brass-cylindered pumps fitted with brass valves are used to bring up the oil from the tanks. The latter are incased in steel and mounted on a heavy 2-in. steel frame which is fitted with a steel axle. The rear wheels are 16 in. in diameter and the front wheels 6 in. The latter are swiveled and fitted with heavy yokes and supports. A steel rod serves as a handle and is of $\frac{3}{4}$ -in. diameter projecting 7 in. from the body of the wagon. It is securely riveted to heavy steel angle at the top of the tank. The top



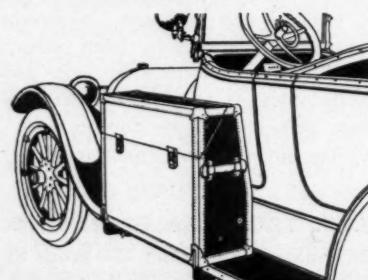
Shular steering wheel lock, showing method of attachment



H-B. battery charger, showing control board



The Blake fastening and locking device for attaching trunks or boxes to the running board



of the tank is in the form of a sink and fitted with two 5-in. drip pans and filler openings. The pumps are rapid in operation and fitted with locks. The wagon can easily be run from place to place and is attractively finished in dark green and red. The pumps are finished in aluminum. The dimensions of the outfit are as follows: Length, 28 in., width, 19 in., height, 25 in., and the actual floor space, wheel to wheel, is 36 in.

National Emblem for Radiators

This consists of a shield 4 by 4 1/4 in., designed to be fastened to the radiator. The colors are applied in porcelain enamel, on 18-gage steel in bright rich effects. The price is 50 cents with a reduction in quantities. This device is being marketed by the Burdick Enamel Sign Co., Chicago.

Alumifix

Alumifix is the trade name given to a new welding alloy for aluminum recently placed on the market by the Chemical Specialties Co., Kansas City, Mo. This alloy is made up of six metals and its adhesive powers for aluminum have been demonstrated to be equal to the strength of the aluminum to which it is attached, it is said. It is a self-welding alloy and requires that the parts to be joined be first tinned. Forms for lugs or brackets, for the repair of manifolds and crankcases, or the building on of brackets for special equipment may be easily made of tin and when clamped in place, the alumifix is trowed in under the heat of a torch. The price is \$1.50 per pound.

H.E. Battery Charger

Hobart Bros. Co., Troy, Ohio, has brought out a new 1/2-kilowatt battery charger which is of a larger size than that previously marketed. The device is intended primarily for garage men and is rated at 500 watts. The new model will charge from one to seven storage batteries at one run, according to the makers. Automatic voltage control within the set itself makes it possible to charge, at the same time, batteries of different voltage. A feature of the charger is said to be the ease with which it can be operated. No electrical experience is necessary and the garage man needs only to connect it to the city current lines when it will be ready for use. Connection to the city mains is made at the two terminals above the rheostat, the latter governing the charging rates. The batteries being charged take current from the two terminals immediately below the rheostat. The instruments at the top of the board record the charging rate and voltage, while the switches at the bottom are used to start charging.

Rie Nie Tire Patch

This patch is self-vulcanizing and is said to be suitable for the smallest puncture or the largest blowout. As an emergency patch the Rie Nie may be used on easings, rubber hose, coats, water bottles, etc. In repairing a puncture, the surface

around the latter is cleaned and a coat of cement applied which is allowed to dry. The cloth from the soft rubber side of the patch is removed and the latter applied to the surface waiting to be repaired, using a firm pressure. No cement is applied to the patch which, it is claimed, will set immediately. The small size, which amounts to 36 sq. in., sells for 50 cents, while the larger size, 108 sq. in., sells for \$1. Durkee-Atwood Co., Minneapolis, Minn.

New Two-Row Ball Bearing

A new design of two-row ball bearing has been placed on the market by the Carlson-Wenstrom Co., Philadelphia, Pa., which has been manufacturing gages and similar articles for the last five years. The new bearing has no filling groove in either

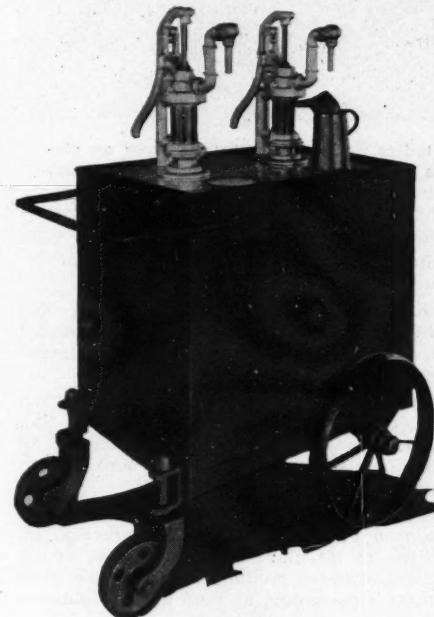
the outer or inner race, an ingenious method of assembling permitting of dispensing with these grooves. Two types of the bearing are made, one, with a separating cage, for high speeds, and the other, entirely filled with balls, for low speeds. The outer race is in one piece, but the inner race is made in halves, and by rocking the inner race around in the outer race an opening is formed through which the balls can be inserted. The same concern also will manufacture the Akimoff dynamic balancing machine which has been redesigned and renamed the Carwen dynamic balancing machine. This same trade name, Carwen, is applied to the ball bearing.

Two Apco Ford Specialties

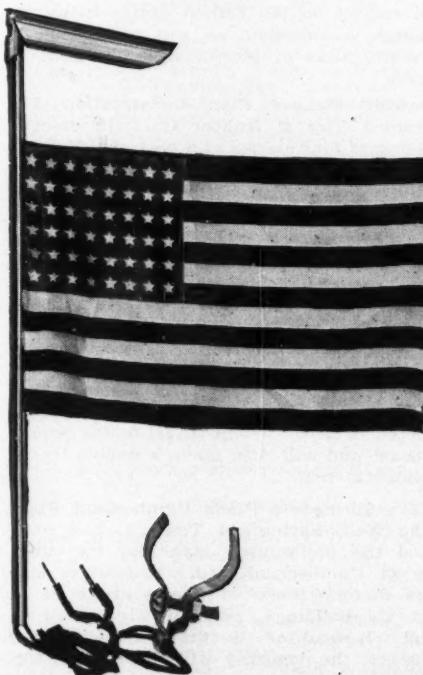
The Apco Mfg. Co., Providence, R. I., successor to the Auto Parts Co., is marketing two new specialties for the Ford car. The Apco horn button attachment replaces the usual signal button located on the steering column under the wheel and places the button in the center of the wheel and on top, where it is convenient to the driver. The button can be attached by the owner in a few minutes, comes with necessary wiring and instructions and is listed at 25 cents. The triple flag holder designed for Ford is so constructed that it can be securely locked to the tapered filler tube and carries the three flags in a crossed position. The holder displays the flags to an advantage and does not conceal the middle flag. The design can be attached easily, is a permanent fixture, comes finished in black enamel and retails at 25 cents.

Blake Runningboard Lock

A clamp for fastening trunks or boxes to the runningboard of the car that also is a lock is made under the name of Presto by Ludwig L. Blake, Emerick and Madison streets, South Bend, Ind. A trunk is furnished for those who wish it, with the channel section built into the corners into which the clamp fits. For attaching a box to the runningboard, or for fastening any trunk the car owner may wish, another style of fitting is made that may be riveted to the side of the trunk or box. The U-shaped clamp is made so that one end joins with the fitting on the trunk or box and the other slips under the runningboard. A special key is used to put tension on the clamp. This is so designed that it cannot be removed except by use of the special key. The outside fasteners with clamp sell for \$4 per set of two. The outside plates with rivets sells for 35 cents a set and the wrench at 25 cents. A special trunk for Fords, 30 in. long, 22 in. high and 10 in. wide, with a 7-in. tray, together with lock and waterproof cover sells at \$20. One can make his own container for suitcases and by using the locking device and a waterproof cover make a neat carrying case. The locking device permits of easy putting on or taking off of the trunk without marring the car.



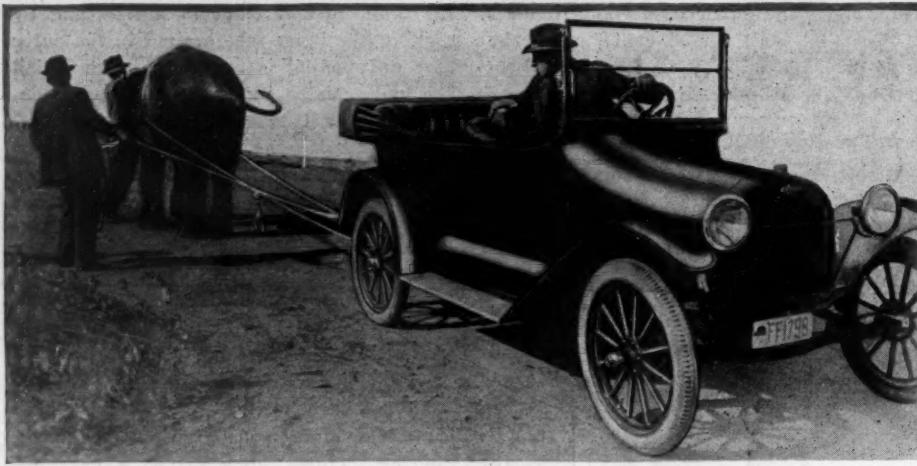
The Tokheim oil wagon designed for curb service



Howe electric lighted flag holder, showing brackets for attaching to radiator



Among the Makers and Dealers



A PLAYFUL GAME OF TUG-OF-WAR—Here, ladies and gentlemen, we have an elephant of the Selig zoo, Los Angeles, Cal., and a Chevrolet Four-ninety at play. Moving pictures made it immortal

OAKLAND Plans 1917-18 Schedule—Production of the Oakland Motor Car Co. for the 1917-18 season is scheduled to be 60,000 cars.

Sigmond Gets Army Commission—W. F. Sigmond, of the Dorris Motor Car Co., a former United States army man, has been commissioned as a captain of artillery.

Bryan Becomes Harroun Research Engineer—Harry F. Bryan has become research engineer of the Harroun Motors Corp. He was formerly research engineer of the Master Carburetor Co.

Perfection Tire Starts Branch Plant—The Perfection Tire & Rubber Co., Chicago, is starting a branch plant for the manufacture of tire and asbestos cloth. It will be an eight-set plant to employ between 400 and 500 operatives.

Absorbs Sandbo Starter Co.—The Bear Mfg. Co., maker of motor car starters, has been incorporated with a \$200,000 capital to do business in Illinois. It has taken over the Sandbo Starter Co., Rock Island, Ill., and will locate its plant in that city.

Lane Heads Victor Storage Battery—Dick R. Lane has been elected president of the Victor Storage Bater Co., Inc., Rock Island, Ill., to succeed E. E. Winters, whose holdings he acquired recently. Mr. Winters will continue with the company as consulting engineer.

Norwood Heads Republic Rubber—Guy E. Norwood, who recently resigned from the B. F. Goodrich Co., has been appointed president of the Republic Rubber Co. Thomas L. Robinson, who retires in favor of Mr. Norwood, will continue as chairman of the board of directors.

Prest-O-Lite Gives Workers Garden Plots—The Prest-O-Lite Co. has turned over 17 acres of ground near its plant to workmen, who are planting the ground in small garden tracts. F. D. Ensminger, director of safety and social welfare of the company, has supervision over the work.

Menominee Closes Large Truck Contract—The Menominee Motor Truck Co., Menominee, Mich., has closed a contract with the Claude M. Nankivel Co., New York, a large exporting concern, for approximately \$2,000,000 worth of Menominee trucks for shipment to foreign shores. It is said that most of the trucks will go to Russia, where

C. M. Nankivel, president of the New York company, is now engaged in the establishment of headquarters.

United Truck Declares Dividend—The United Truck & Equipment Co. has declared a dividend of 1½ per cent on its preferred stock.

Pyro Ignition to Move—The Pyro Ignition Co., New York, will move to Reading, Pa., and has leased a three-story factory, in which it will employ forty men and women to produce spark plugs.

Firestone Adds \$1,000,000 Structure—The Firestone Tire & Rubber Co. is erecting an addition to its plant at a cost of \$1,000,000 and will increase production from 20,000 tires to 30,000 tires a day, as soon as this addition is finished.

Tom Jones Leaves for Russia—Tom O. Jones, who recently was appointed to foreign service on the United States industrial research commission, as was announced in a recent issue of MOTOR AGE, has gone to Russia.

Detroit Makers Plan Construction—The Firestone Tire & Rubber Co. will erect a building of four stories at a cost of \$500,000 in Detroit for sales and stock purposes. The Cadillac Motor Car Co. will build a sales building of seven stories at a cost of \$500,000, and the Packard Motor Car Co. will build a sales building of eight stories to cost \$1,200,000.

Hyatt Starts Test Trip—The Hyatt Roller Bearing Co. has started on another journey the Buick car which has a verified record of 261,800 miles of travel and which still contains the original set of Hyatt bearings with which it was equipped. The car was constructed in 1909. It will travel to the Atlantic coast and will then make a double trans-continental trip.

Kelly-Springfield Plans Cumberland Plant—The Kelly-Springfield Tire Co. has completed the preliminary plans for its buildings at Cumberland, Md. Instead of one large factory there will be a group of at least six buildings, none of which will be small. Instead of the first expenditure of \$1,500,000, the company will spend \$5,000,000. The main factory will be over 600 ft. long and more than 400 ft. in width and will be from two to four stories in height. Provisions will be made to include in it every department

of welfare work that the most modern factories have. A hospital section, rest rooms, swimming pools, eating rooms and cooling systems will be installed.

Mickim Joins Green Agency—A. W. Mickim, formerly advertising manager for the Liberty Motor Car Co., has joined the staff of the Carl M. Green advertising agency.

Rolls-Royce to Build Service Station—The Rolls-Royce Co., Ltd., London, has purchased land in Long Island City and will build a four-story garage and service station.

Winans Joins Harroun Organization—R. E. Winans has been appointed service manager for the Harroun Motor Corp. Mr. Winans formerly was connected with the Paige-Detroit Motor Car Co. as service manager.

Pennsylvania Rubber Declares Dividend—The Pennsylvania Rubber Co., Jeannette, Pa., has declared the usual quarterly dividend of 1½ per cent on preferred and 1½ per cent on common stock, payable June 30 to stock of record June 15.

Canadian Chalmers Producing in New Plant—Production has started in the new Canadian Chalmers factory. It is two weeks since the erection of temporary buildings began. Over 20,000 sq. ft. of floor space are now under roof. The new factory is being rushed forward to completion with all possible speed.

Globe Tire to Start Operation Soon—The Globe Tire Company, Laporte, Ind., announces that it will have its plant ready for operation in ninety days. The new company has bought a large factory building and is converting it into a tire manufacturing plant. Most of the machinery already has arrived, and workmen now are remodeling the plant.

LeRoi Co. Extends Plant—The LeRoi Co., Milwaukee, Wis., manufacturer of four and six-cylinder engines for passenger and commercial cars and tractors, has broken ground for a one-story machine shop addition to its plant. The company several months ago took over the motor business and plant of the Milwaukee Machine Tool Co. and is capitalized at \$350,000.

Bimel Wheel Company Adds New Kilns—The Bimel Spoke & Auto Wheel Co., Portland, Ind., is completing additions costing \$60,000. These consist of six new dry kilns, said to be the largest compartments in use in any wheel plant so far. The kilns permit of drying spokes and fellos for small truck wheels at the rate of 400 sets a day. The capacity in the truck wheel department is now 175 to 200 sets a day.

Allen Community Gets Another Plant—The Fostoria Press Steel Co. has been organized for \$100,000 and will make all pressed steel parts required by the Allen Motor Co. The officers are: President, Henry Rothrock; vice-president, George E. Kirk; secretary, E. C. Wolfe, and treasurer and general manager, C. D. Pifer. The Dale Body Co.'s new plant is already under construction, and this company is to have a plant with 20,000 sq. ft. of floor space.

Maxwell Appoints Distributor for West—William J. La Casse has been appointed Pacific Coast supervisor for the Maxwell Motor Sales Corp., with headquarters in San Francisco, Cal. With this appointment the Maxwell again places one man in charge of the distribution of Maxwell cars throughout the West, including in all practically nine states. **Keys to Assist Utz of Standard Parts**—Walter C. Keys has been appointed assistant to J. G. Utz, director of engineering for the

Standard Parts Co., Cleveland, Ohio. Mr. Keys was for several years with the Cadillac Motor Car Co.

New Tractor Company is Formed—The Day-Hamlin Mfg. Co. has been formed at Jackson, Mich., with a capital of \$50,000 and will manufacture tractors and tractor parts.

Dyer is Scripps-Booth Special Representative—H. L. Dyer has been appointed special representative for the Scripps-Booth in the southern district, with headquarters at Atlanta, Ga.

Briggs Returns from London—Stephen D. Briggs has returned from London, where he has been representing the Hupp Motor Car Co. Mr. Briggs will return to his old position as branch manager of the Northwest Hupmobile Co. at Minneapolis, Minn.

Stroh Business Increases—The Stroh Casting Co. created three new production records in March this year. The foundry turned out 219,723 castings or 687 tons, an increase of 206 tons over last January, which month held the previous high mark. Of these castings 19,019 were transmission cases. The inspection records display a 214-ton increase and the shipping 679-ton increase.

Ryan Enters Officers' Reserve Camp—Jack F. Ryan, manager of the Danville, Ill., branch of the Gibson Co., Indianapolis, Ind., has entered the officers' reserve corps camp at Fort Benjamin Harrison. Mr. Ryan has been with the Gibson Co. for the last seven years, a part of the time having been spent in the wholesale accessory department.

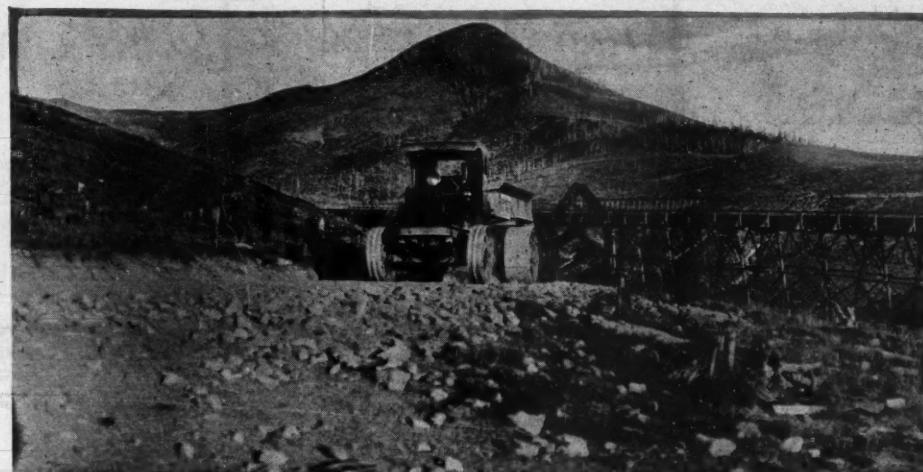
Levey Leaves Service Motor—William B. Levey, purchasing agent of the Service Motor Supply Co., Chicago, has resigned. Mr. Levey is well known to the industry, having been buyer of the Auto Parts Co. and connected with the American Electric Car Co., both of Chicago. Mr. Levey is contemplating making a new connection, which will be announced shortly.

Spring City Foundry Co. Adds—The Spring City Foundry Co., Waukesha, Wis., specializing in motor castings and parts, has awarded contracts for the erection and equipment of a one-story foundry addition, 80 by 140 ft. Ground was broken June 8 for the new building, which will be of structural steel and brick, on concrete foundations, with a large area of glass walls and roof.

Shipments of Stanley Cars Double—Shipments of Stanley steam cars for April, 1917, were more than double those for the same period last year. May shipments were also more than 225 per cent over those of 1916. Statements that the company is contemplating bringing out a \$1,000 car are denied. Frederick S. Young has become advertising manager of the company, and Charles E. Broad has been placed in general charge of the engineering and designing.

Morgan Potter Company Changes Name—The Morgan Potter Mfg. Co., Beacon, N. Y., for more than thirty years engaged in manufacturing an accessory to the carriage trade, has decided to devote its efforts to the motor industry in the future and has changed its name to the Morgan Potter Motor Co. The company will not only make trucks and truck attachments for converting cars into trucks but will make a medium-priced, four-cylinder, five-passenger touring car.

Challoner to Make Anti-Skid Device—The Challoner Co., Oshkosh, Wis., founder and machinist, has taken a contract to manufacture a new type of anti-skid device for commercial cars, designed by William H. Krug, a member of the Challoner staff and its subsidiary, the Giant Grip Co., organized to market the new device. The Krug device has been named the Giant Grip. It consists of a set of clamps fastened permanently to the spokes of wheels equipped with solid tires. These clamps support chains going around



TRUCK HAULS HEAVY LOADS OVER DIVIDE—This White truck operates continuously in three 8-hr. shifts, making one round trip of 32 miles over the Continental Divide every 6 hrs. and allowing 2 hrs. for terminal work. It hauls ore from the French Gulch mine to the railroad

the tire. The chains are readily removable and any number may be attached or detached, according to the conditions of service.

Firestone Makes New Appointments—E. W. BeSaw has been made assistant general sales manager of the Firestone Tire & Rubber Co. H. A. Grubb, Texas manager, succeeds him as western district manager. C. H. Sorrick has been appointed manufacturers' sales manager, and J. D. Hess, Jr., Cleveland branch manager, has been appoint-

ed manager of the pneumatic sales department to succeed him. All four men have been with the Firestone company for several years.

De Maringh Leaves Gurney for U. S.—A. de Maringh has resigned his position with the Gurney Ball Bearing Co. as manager of the Chicago office and has joined the U. S. Ball Bearing Mfg. Co. He will have his office in Chicago with the factory and will be in charge of the Mid West territory.

Kissel Prepares Trucks for Export—The Kissel Motor Car Co., Hartford, Wis., is working on an order for forty-three Kissel trucks, in 1-, 2- and 4-ton sizes, for its representatives in the Dutch East Indies. Delivery also is being made of a consignment of 300 Kissel Hundred-Point Sixes destined for Madrid, Spain.

Crow-Elkhart Plans Expansion—The Crow-Elkhart Motor Co., Elkhart, Ind., has purchased a factory site of 26 acres adjoining the present plant. M. E. Crow, president, said the purchase means several extensions will be erected to the plant. The company recently completed a new administration building and a wood working plant, which cost \$20,000. Two additional structures are to be erected, which will be used for the manufacture of a new line of convertible five-passenger cars the company expects to place on the market.

Changes in Locomobile Executive Organization—Clinton B. Amorous, who has been assistant to the general sales manager of the Locomobile Co. of America, has resigned to join the Parish Mfg. Co., Detroit, as assistant to C. C. Ostrom, factory manager. P. W. Hine, formerly manager of the Bridgeport branch, has been appointed assistant sales manager. M. A. Pollock succeeds Mr. Hine at Bridgeport, and with him goes F. C. Bancroft as superintendent of the service department. Mr. Bancroft has been in the service department of the New York branch.

Milwaukee Makers to Further Foreign Trade—The Merchants & Manufacturers' Association of Milwaukee has undertaken the organization of a foreign trade bureau which will seek business all over the world. The firms identified with the motor car, truck and accessory industry which are represented on the special committee to carry out the plan include: Auto Parts Mfg. Co.; Sterling Motor Truck Co.; International Harvester Corp.; A. O. Smith Corp.; Stegeman Motor Car Co.; Wadham's Oil Co.; Wisconsin Motor Mfg. Co.; Kempfsmi Mfg. Co.; Koban Motor Co.; Evinrude Motor Co.; Harley-Davidson Motor Co.

Coming Motor Events

CONTESTS

—1917—

- June 16—Chicago, speedway.
- July 4—Visalia, Cal., road race.
- July 4—Spokane, Wash., track.
- July 4—Benton Harbor, Mich., track.
- July 4—Uniontown, Pa., speedway.
- July 4—Tacoma, Wash., speedway.
- *July 4—Omaha, Neb., speedway.
- July 14—Rochester, N. Y., hillclimb.
- July 15—Missoula, Mont., track.
- July 17-19—Intercity Reliability.
- July 22—Anaconda, Mont., track.
- July 29—Great Falls, Mont., track.
- Aug. 5—Billings, Mont., track.
- Aug. 17—Flemington, N. J., track.
- Sept. 3—Cincinnati, Ohio, speedway.
- Sept. 3—Uniontown, Pa., speedway.
- Sept. 6—Red Bank, N. J., track.
- Sept. 8—Pike's Peak, Colo., hill climb.
- Sept. 15—Providence, R. I., speedway.
- Sept. 22—Allentown, Pa., track.
- Sept. 28—Trenton, N. J., track.
- *Sept. 29—New York, speedway.
- Oct. 6—Uniontown, Pa., speedway.
- Oct. 6—Danbury, Conn., track.
- *Oct. 13—Chicago, speedway.
- Oct. 13—Richmond, Va., track.
- Oct. 27—New York, speedway.

* A. A. A. Championship Award Event.

MEETINGS

- June 25-26—Washington, D. C., S. A. E. midsummer.

SHOWS

- June 20-27—Montreal used car show.
- Aug. 6-18—Fremont, Neb., tractor demonstration.
- Sept. 9-15—Spokane, Wash., Interstate fair.
- Sept. 2-9—Milwaukee show, State Park fair, West Allis.
- Oct. 13-28—Dallas, Tex., state fair.



From the Four Winds



MICHIGAN Registers 177,000 Motor Cars—Although the year is not half over more motor cars have been licensed in Michigan than in the twelve months of 1916. Last year's total was 160,050. There are 177,000 licenses issued to date this year.

Add: Among World's Biggest—Last year the Stewart-Warner corporation produced enough speedometers to reach into the air more than 50 miles if piled one on top of the other. As the speedometer is only 3 in. high it would take more than 1,000,000 to do this, but last year's output passed the million mark. This would be 250 times the height of the Eiffel Tower and 350 times that of the Woolworth building, both among the world's biggest.

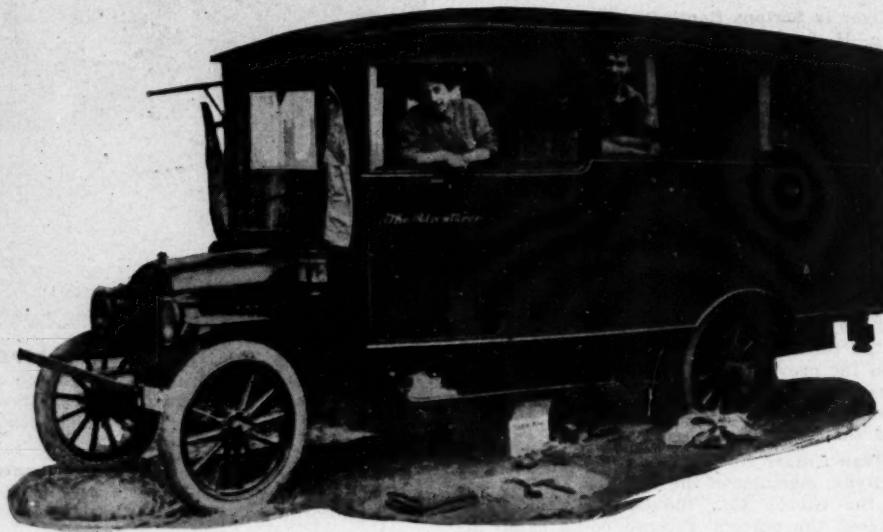
Shanghai Carriage Builders Turn to Cars—Motor cars gradually are displacing horse vehicles in China. After sixty-six years the foremost horse-vehicle landmark in China has recognized the steady advancement in the sale of motor cars and has turned to the making of motor car and truck bodies. The horse-vehicle features gradually are yielding to the steady encroachments of the motor department, which is conducted by an American.

What Motor Tourists Spend—Replies from seventy-six tourists to letters sent out by the state highway commissioner of Colorado indicate that each car carries four persons as a rule, the average expenditure is \$3.30 a person daily and the average stay in the state is 28.6 days. The records of travel counts and other estimates indicate that during 1916 about 26,500 cars of non-residents passed through Colorado. The commissioner estimates, on the basis of his replies, that as a result of touring \$10,000,000 was spent in the state.

Penn Highway Farmers Buy More Cars—The ownership of motor cars by farmers in the counties along the William Penn highway is increasing at the rate of 50 per cent a year, figures issued by the State Agricultural Department show. At the close of 1915 the farmers in these William Penn counties owned 6391 cars; at the close of 1916 the total had increased to 9868. Washington county led the list with 1135 cars. The value of the farms in the eighteen counties bordering on the William Penn highway is estimated at \$499,760,129.

Pennsylvania Standardizes Grade Crossing Guards—All gates at grade crossings in Pennsylvania will be painted with black and white stripes by the middle of July, according to the public service commission. This is part of the program for standardization of grade crossing protection which the commission placed in the hands of John P. Dohoney, investigator of accidents. Watchmen will discard the old time red flag and display a 16-in. red disk with the word "stop" in black letters as a warning at crossings. According to the records of the commission there are 734 crossings in the state with gates and 633 have watchmen.

Rhode Island Ready for New Laws—The Rhode Island highway commission has decided to take time by the radiator and has ordered by the motor car numbers for 1918 now. On Jan. 1 the new motor law will go into effect, compelling registration annually at the beginning of each year, and the plates will bear the year number and R. I. as well as the registration figures. Now the cars are registered for a year from the time the application was sent in, and so it is not always possible to tell whether or



AT HOME ANYWHERE

Many cars are fitted up with camping outfits, insuring some measure of ease for a more or less temporary period, but a car doing duty as a permanent home and equipped with all the comforts of an up-to-date apartment is something novel, especially when it combines a well-stocked printing office with convenient, sanitary living quarters. Such is the touring car built and operated by Mr. and Mrs. L. W. Robins—Citizens of the World—at home anywhere. They had a little money and looked about quite a bit for a place where land was cheap and taxes low, but failing to find this Utopian situation they determined to create it themselves. Like the rest of us, they have to work for a living, so their figuring and planning resulted in a combination housekeeping and business establishment on wheels.

The car is equipped with running water, the tank being placed high enough to provide good pressure. A compact gas plant for cooking and electric apparatus for inside and outside lighting are present. The household furniture is mostly built-in and consists of a bookcase, medicine chest, store cupboard, kitchen cabinet, ice box, bed, bath tub and table, all of which are dustproof and waterproof. There are folding chairs, folding—but what's the use? There is everything, including a cabinet grand Victrola and a lot of high-brow music.

Mr. Robins is a printer by trade and earns a living as he goes along. The printing office is fitted with a 6 by 9 power press, by which stands a cabinet net containing all the type faces required for ordinary work. The machine has been on the road now for more than a year, and the family exchequer shows several hundred dollars to the good.

not a car is properly registered. This year a batch of numbers for Massachusetts from 75,000 to 100,000 got lost in the freight embargo shuffle somewhere, and so cars bearing numbers from 100,000 upward were on the streets before ones with the 75,000 and up. It is only recently that the lost numbers were located, and they are being given out now.

Maxwell Touring Car Makes Record Run—What is said to be the record motor car Maxwell touring car, driven by G. J. Fix made the run from Dallas to San Antonio, 298½ miles, in 7 hrs. and 34 min. The Texas Special of Katy makes the distance in 7 hrs. and 55 min. and runs only 287.3 miles.

Ruling in Jitney Accident—When a man rides a jitney bus in preference to street cars, he takes his life in his own hands, judging from the finding by a jury this week in district court at Dallas, Tex.; in the case of J. N. Griswold against an interurban company. Griswold was suing for \$40,000. He got nothing. He was injured when an interurban car hit a jitney in which he was riding.

Texas to Boost Roads—One of the biggest good roads meetings ever held in the Southwest will take place beginning June 20 at Mineral Wells, when the annual meeting of the Texas Good Roads Association will be held. Plans for highways that will extend from border to border of the state are to be discussed. These proposed roads mean much to the motorists because they will open more direct routes from the North and East to the Gulf.

Ontario's Motor League Closes Tenth Year—More than 20,000 road signs for touring motorists have been erected in Ontario during the last few years by the Ontario Motor League, nearly 3000 of them during the last year. The league closed its tenth year with a total membership of 5635. The club has done much for good roads in Canada, and license exchange with New York, Michigan and other states is the result of a campaign started by the society. It has been estimated that 50,000 cars entered Ontario from the United States in 1916.

Des Moines Eliminates Its Worst Road—Des Moines had one worst road. The Motor Trades Bureau of the Des Moines Chamber of Commerce decided to do away with it and did. The entire membership, 150 strong, put on its various overalls, gathered together its various roadmaking tools and repaired to the worst road. A battery of motor trucks hauled many tons of sand and gravel and cinders to the scene of action. County road workers put the road to proper grade and at the close of a union 8-hr. day the worst road was a bit of classy boulevard.